AN EVALUATION OF CLIENT-GENERATED RISKS IN CONSTRUCTION CONSULTANCIES

by

SIMON TANTOH KOMETA, BEng., MSc.

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DEDICATED TO MY FAMILY

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ABSTRACT

To evaluate client-generated risks, client organisations were first studied and a complexity of factors influencing the decision to build identified. The intriguing issue of whether clients and consultants have the same understanding of the responsibilities of construction clients on proposed projects was examined. Using structured questionnaires targeted at these two groups and employing the relative index ranking technique evidence seems to suggest that while clients and consultants have similar perceptions of what constitute clients' responsibilities in the construction process they attach different importance ranks to them. Partnering and long term relationships will bring them closer.

The capacity of construction clients to affect the performance of their project consultants was examined. A 'good' client would exert a positive influence on consultants' project performance; the converse is true. It is prudent for consultants to be aware of project-relevant attributes of their clients and the possible effects on their commercial viability. Client attributes derived from literature and a pilot survey were presented to construction consultancies in a major survey to establish possible effects on project performance.

After establishing the relationship between client attributes and consultants' project performance, current client evaluation methods were critically reviewed. While there has been much work on methods for evaluating consultants and contractors by clients, it is a rarity in literature to find previous studies on client evaluation, the little available studies are limited to the evaluation of client financial stability only and done in an adhoc manner. Only recently has the evaluation of clients by consultants started gaining ground. This is due to the increasing vulnerability of consulting and contracting firms, partly to clients' action or inaction and partly due to the unstable economic situation. The thesis then progressed on to presenting a systematised quantitative framework for evaluating construction clients based on 47 organisational attributes grouped under 10 main headings. The model which enables consultants to identify particular areas of strengths and weaknesses and suggest where specific actions are needed during project implementation was tested for applicability on 29 consrtuction projects with definitive outcomes; and was found to be more conservative in identifying project outcomes in all but two outliers. A helpful tool for evaluating client-generated risks to construction consulting firms has been developed.

DECLARATION

No portion of the research referred to in this thesis has been submitted in support of an application for another degree or qualification at this or any other university or other institution of learning.

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ACA	Association of Consulting Architects
ACE	Association of Consulting Engineers
APO	Aggregate Project Outcome
BPF	British Property Federation
BS	British Standard
CICE	Construction Industry Cost Effectiveness
CIEC	Construction Industry Employers Council
CII	Construction Industry Institute
CIOB	Chartered Institute of Building
CIRIA	Construction Industry Research and Information Association
CSSC	Centre for Strategic Studies in Construction
CPG	Client Project Group
ICE	Institution of Civil Engineers
ISO	International Standard Organisation
JCT	Joint Contracts Tribunal
LRC	Linear Responsibility Chart
NEC	New Engineering Contract
NEDO	National Economic Development Office
PCFA	Principal Component Factor Analysis
RIBA	Royal Institute of British Architects
SPSS	Statistical Package for the Social Sciences
TMO	Temporary Multi-Organisation
VAT	Value Added Tax

CHAPTER 1

CHAPTER 1

GENERAL INTRODUCTION

1.1 Introduction to subject matter

The needs, requirements and nature of construction clients are constantly changing. In the last twenty years clients have moved from being traditional, naive and inexperienced to becoming sophisticated and more experienced in construction matters. Nowadays, construction clients are corporations, syndicates, property developers (mostly disbanded subsidiaries of construction companies), a foundation, or a government agency; with attendant communication problems between the client and the consultant because of complicated procurement procedures. Thus, consultants are facing fundamental changes not only in the nature of their client but also in the milieu in which their work is done (Foxhall, 1975).

Changes in the construction industry particularly in consulting firms to reflect the changing nature and ever increasing needs and requirements of construction clients have been slow. Because the industry has not prepared for this change, the new breed of construction clients pose some risks to the commercial viability of traditional construction consulting firms. The slow response to this change is influenced by the fact that construction clients are big corporations. Also, despite the multitude of studies / investigations on the risk that contractors or the project consultants can pose to the client, little research has viewed the client itself as a source of potential risk to the commercial viability of construction consultancies. Simply, the nature of the risks and their potential influences on construction companies have not been studied / investigated and so the companies have not been alerted.

The reasons for this apparent omission range from construction business being such that big corporations or clients dominate and select consultants - not the other way round. Consequently, the corporate client demand accountability to an extent found in no other market for professional services. They bring an array of their own specialists to a project including technical specialist, building specialists, and operating personnel. Other corporate staff for instance, finance, legal, accounting and purchasing, may at some level participate in the project

(McElroy, 1984). The virtual domination of the business relationship by big corporate clients should be of some concern to consultant who will like to profit from such relationship.

Construction clients are demanding more and more services from consulting firms for lesser fee; and no business institution can continue trading on this basis for long. In fact, a recent interview by Sir Michael Latham ('Interview', 1995) showed that a disturbing number of the Association of Consulting Engineers (ACE) members are reducing services in one way or the another because of the extremely low fee bids they were being required to submit. Depressed rates of payments are having harmful effects on projects; for instance much less consideration is now being given to design alternatives, even to checking and reviewing designs. As a result, the risks for design errors are rising, and construction costs are being pushed up due to the reduction of resources as a direct result of clients looking for cheap design or not paying the designers adequately.

Poor briefing on the part of the client add no value to a project and influence the eventual outcome of projects. Depressed rates and poor briefing are only two of the variables that affect the performance of construction companies in general and consulting firms in particular.

1.2 Objectives

In view of the discussions above, the research described in this thesis evolved around establishing a methodology for evaluating client-generated risks to project consultant. Achieving this objective necessitated the development of a technique to quantify construction clients' attributes and hence the risk that construction clients pose to project consultants. The research therefore had the following sub-objectives which must be achieved in order to accomplish the overall objective:

(i) investigate the client organisation to establish factors influencing the decision to build;

(ii) investigate the fundamental needs of clients and their responsibilities in the construction process;

(iii) investigate the consultant needs and factors influencing their commercial viability;

(iv) identify attributes in clients' organisations which (according to project consultants) are necessary for successful project performance;

(v) evaluate the relative importance of the attributes identified in (iv);

(vi) calculate weight constant for the attributes; and

(vii) develop and test a model for evaluating project consultants' risk exposure to construction clients.

1.3 Methodology

This research arose out of a perceived need to understand and evaluate the potential risks that construction clients pose to project consultants. After reviewing the literature to establish the theoretical background to the investigations, the rest of the research was divided into four phases: the development of techniques and procedures for data collection; the data collection; the analysis and development of model; and the validation of the model. Figure 1.1 explains this in greater detail.

1.4 Organisation of the thesis

Figure 1.1 illustrates the various steps taken in this research to achieve the stated objectives. These steps are classified into four major phases which are presented as eleven core chapters the description of which now follows.

Chapter 2 - This chapter introduces the construction client, categorising them into three main groups. Client needs as identified by other investigators are highlighted; the role of clients in the construction process is discussed as well. The changing nature of clients is also examined. The chapter progressed to examine consultants' needs and roles in the construction process and concludes by explaining the relationship between the construction client and his consultant.

Chapter 3 - The basis of client evaluation in the industry is discussed. Studies of client performance are presented and client-generated risks to consultants are discussed. The chapter concludes by highlighting some common client evaluation practices in the construction industry; highlighting that it focuses almost exclusively on client financial stability to the neglect of other project relevant attributes within the client organisation.

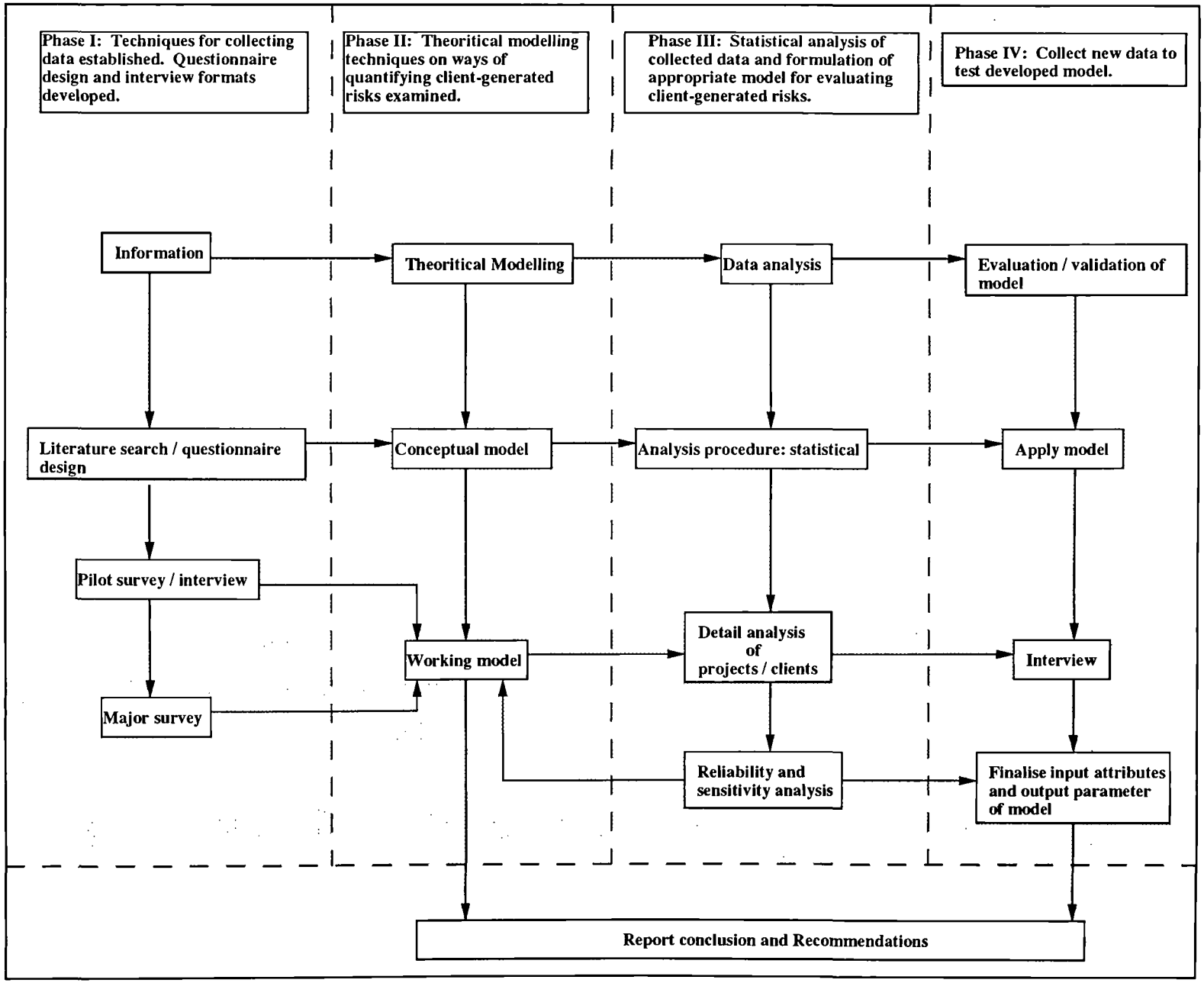

Figure 1.1 Research Methodology

Chapter 4 -This chapter progressed to identified and discussed other important clients' attributes affecting the performance of project consultants. Based on the literature review in the preceding chapters, the hypotheses and design of this research are also presented in this chapter. The questionnaire design, sample selection and surveys are all described in this chapter. The techniques used for data analysis are also presented.

Chapter 5 -Having confirmed that the client decision to build is determined by many factors, it is important to evaluate these factors highlighting their relative importance. The evaluation of different factors influencing the client decision to build is discussed in this chapter. To understand the structure and relationship between the factors, correlation and factor analyses were carried out and fully discussed. Characteristics of the client organisations who participated in the survey are also presented in this chapter.

Chapter 6 - Having established the factors influencing client decision to build described in chapter 5; this chapter discussed the fundamental needs of construction clients and the their perceived responsibilities for satisfying these needs. The importance of client responsibilities in the construction process as perceived by clients themselves and project consultants is also discussed in this chapter.

Chapter 7 - After the brief introduction of project consultants in chapter 6 in light of their perceived importance of client responsibilities in the construction process; this chapter discusses the characteristics of the consulting firms who participated in this investigation. The determinants of the commercial viability of the consultants are highlighted and their relative importance discussed. The determinants were further examined using factor analysis techniques. The derived factors were then correlated with client attributes identified in the chapter 4 and significant results obtained.

Chapter 8 - With the background knowledge that clients' attributes affect the determinants of the commercial viability of consulting firms described in chapter 7, a detailed study of clients' attributes is presented in this chapter. The relative importance of clients' attributes evaluated using the relative index technique are discussed.

Chapter 9 - Having established the relative importance of clients' attributes described in chapter 8; this chapter present a discussion of the transformation of the relative importance indices of the attributes into attributes weight constant which form the basis of the client evaluation model also described in this chapter. The chapter also presents the procedures for implementing the model.

Chapter 10 - This chapter presents a series of independent evaluation approaches for assessing the clients' attributes used to developed the client evaluation model described in chapter 9. The results from these assessments formed input data for the model.

Chapter 11 - This describes the procedures taken to validate the developed model. Results of the validation exercise and practical application of the model are discussed.

Finally, **Chapter 12** concludes the results obtained in the research and give some fundamental use of the model in the construction industry. Areas of future work are also suggested.

CHAPTER 2

CHAPTER 2
THE CONSTRUCTION CLIENT AND THE CONSULTANT IN PERSPECTIVE

2.1 Introduction

The importance of construction clients to the industry can not be over emphasised especially in periods of economic uncertainty when orders for construction products may fluctuate leading to many companies facing liquidation. Construction clients are champions in the industry. But who is the construction client?

As a prelude to understanding the relationship between the client and the project consultant, it is pertinent that we understand who they really are. This chapter seeks to clarify the definition, nature and needs of construction clients and their project consultants. A critique of their relationship is also attempted.

2.2 Who is the construction client?

This may seem a very trivial question but the answer can be most critical; particularly as there are many definitions of construction client as there are construction engineers! Knowing the client is very important as the consequence of dealing with the "wrong" client is at best unproductive and, at worst, destructive (Blake and Mouton, 1982). For our purpose the following definition has been adopted because of it's generality and completeness:

> "The client is the party who commissions the building, and may be a private individual in need of a building for his own or his family's personal use, an enterprise requiring premises for commercial or industrial purposes, or an institution or agency of government - local, regional, or central for some public purpose." (Bryant et. al. 1969)

The term construction 'client' is not necessarily singular. In most construction projects clients are represented by committees. The construction industry has over idealised her clients to a simple entity (Cherns and Bryant 1984). This idealisation has done untold damages to the industry. For instance, the needs and requirements of clients are not fully appreciated. Furthermore, the client might not even be the eventual user of the product. In larger

organisations, it is very difficult to identify the client from the eventual users (Bryant et. al. 1978). The construction industry should not take comfort in this but seek to fully identify the needs of all its clients particularly the inexperienced ones.

2.2.1 Categorisation of clients

The construction client being one of the main parties to a building project has been classified in a variety of ways. The literature devoted to classifying clients tend to concentrate on their prime business functions. Newman et. al. (1981) produced a list of 18 client types, such as: private commercial, industrial, developers, leisure, education, hospital and public authorities and even went further and divided some of these into more specific sub-groups. Authors such as Higgin and Jessop (1965) and Masterman (1992) classified clients based on their construction experience. They went on to distinguish between levels of sophistication of clients and categorise them as either "sophisticated" or "naive". They suggested that naive clients will seek some advice, but their initial move will be made from a point of some ignorance.

Austen and Neale (1984) classified clients according to project types i.e building and civil engineering projects. They went on to say that clients in civil engineering projects are nearly always the government. This is true, but it should be noted that private individuals are getting involved with large civil engineering projects through major industrial / civil engineering undertaking such as private toll roads, Channel Tunnel, etc.

RIBA (1980) categorised clients as follows: local government, central government, industry and commerce, nationalised industry, and housing association. Kelly et. al. (1992) classified clients according to size, sector, and project interest. Nahapiet and Nahapiet (1985) and Masterman and Gameson (1994) classified construction clients based on whether they are primary or secondary constructors and their level of construction experience.

2.2.1.1 The private sector client

This represents undertakings by individuals or corporate bodies, which may be small or large, to build. An individual may want to build for owner occupation; or simply need an extension

of their existing facility or a small office building. In small organisations the client body is often made up of the management and the work force whose activities will be affected by the new facility. Even in these simple cases, there is bound to be disagreement on priorities between and among interest groups. Resolution of disputes within small organisations is easy as this rests on senior management which in most cases are individuals. In other words, the decision making unit is relatively easy to identify and probably autocratic in style. This client type does not normally build regularly.

In larger private corporations, it is difficult to identify the client body and the decision making unit. No single individual has an overall authority. Decisions are taken by a number of individuals representing the various interest groups. Client representatives are then selected to pass on this information during the briefing process. In this client type usually all the interest groups are not adequately represented and power within the decision making unit is not equally shared.

2.2.1.2 The public sector client

The Central Government, Local Authorities and Government Parastatals constitute the public sector client. Since these bodies are supposed to have the public interest at heart it would have been expected that they should consult the public but the various public interest groups are not usually fairly represented in the decision making unit.

2.2.1.3 The developer client

The main objective of developer client be it large or small is to make a profit. Developers are treated as a separate client group because of their operational features and prominence in the construction industry. The developer may be a private or a public client or a joint venture of both. The clientele body here is made up of the developer, the funding institution and the user. Each has a different objective in the project namely: the developer wants to make profit, the funding institution wants the project to cost as little as possible to construct but attract a relatively high rent, the user want a building with low running / maintenance cost to perform his business adequately. The occupiers are hardly ever represented in the decision making unit although they are the people who are most likely to be affected by the design of the facility.

Developers tend to build speculatively.

2.3 The needs of construction clients

According to Seymour and Low (1990) clients have two sets of requirements; firstly to get their construction needs translated into a design which specifies the technical characteristics, performance criteria, quality standards and so on; and secondly, to get it built within a specified time and in the most cost effective manner. A survey by Rowlinson (1988), found the following criteria as constituting the clients' requirements:

- functional building;
- client awareness of risk and uncertainties associated with the project;
- accountability of design team;
- hi - tech or innovative design;
- maximisation of usable floor area;
- status, image, and activity of building reflected in design;
- flexibility to change design at any time;
- taxation incentives;
- low maintenance and running costs;
- use of existing premises during construction;
- high / low level of involvement in project;
- desire to be informed of progress at stages;
- balance between capital and long term ownership costs;

A similar survey carried out by Franks (1990) found the following needs:

- technical complexity;
- aesthetics / Prestige;
- economy;
- time of essence;
- price certainty;
- facility for variation;
- exceptional size;
- low maintenance cost.

Bennett and Flanagan (1983) defined a comprehensive list of clients' needs which included:

- functional building, at the right price;
- quality, at the right price;
- speedy construction;
- a balance between capital expenditure and long term ownership costs;

- identification of risks and uncertainties;
- accountability (in the public sector);
- innovative design/high technology building;
- maximisation of taxation benefits;
- flexibility to enable design to be changed;
- a building which reflects the client activities and image;
- an involvement in, and a need to be kept informed about, the project throughout its life.

Another survey by Hewitt (1985), identified the following as the real needs of clients:

- certainty of cost and time, a reduction in unanticipated extra costs and time overruns;
- the flexibility to change the design during the construction period;
- a strong desire to be actively involved, and to be kept informed, throughout the whole of the design and construction process;
- a wish that consultants would be more forthcoming with positive and constructive advice and be more prepared to recommend new procurement methods.

Other studies such as NEDO (1988) and CSSC (1988) both concluded that clients wanted certainty of performance in all three criteria of time, cost and quality in their projects. Masterman (1994) who conducted a comprehensive study on procurement systems selection by clients, found that the following needs were considered to be most important by the majority of clients who participated in the study; and the first three of these needs were ranked highest by the majority of clients:

- a desire to be actively involved and informed at all stages of the project;
- certainty of final cost;
- certainty of completion date;
- value for money;
- lowest possible tender.

It would seem from the lists of client needs by different authors that there is an agreement on identifying what constitute needs. These lists are generalised across industry and it is up to each client to prioritise these needs which will vary from client to client (Franks, 1990). In fact, client priorities can vary from project to project. It is however, possible that for a given client type and a particular building type, a generalised hierarchy of needs for these clients can be produced. From all the needs identified above, the needs shown on Table 2.1 can be seen as the fundamental needs of construction clients.

As we approach the 21st century, the needs of construction clients are increasing and changing particularly the international client; demanding more and more services from engineering and construction firms. Clients want products that are socially acceptable, cost effective, innovative in design and construction. Above all, they want engineering and construction firms that are able to anticipate future trends of customers' businesses and therefore provide services to meet them (Halpin et. al., 1993). This would obviously affect how consultants operate their business in the future.

2.4 The roles of clients in the construction process

Bennett (1985) identified five major roles for construction clients in the construction process. These aspects are very important to clients and their degree of involvement in each varies. Let's examine each role in turn.

2.4.1 Providing primary objectives

This includes establishing cost and time constraints and standard of quality required on the project. This is particularly useful as clients are the best judges of the quality they require, the cost they could afford and the time within which the project is needed. The preparation of the design brief falls under this role. The Wood Report (1975) concluded that a good design brief would contain the following:

- a statement of the purpose of the project, its scope and content and any necessary background information;
- a social brief indicating how and by whom the project is to be used;
- a statement of the desired activities and functions, and relationship between them;
- time constraints and consequence for not meeting it; and
- budget constraints.

An investigation by NEDO (1988), concluded that most of these essential elements are often left out from most design briefs. The client should ensure that the primary objectives of the project are clearly stated.

Table 2.1 Description of the fundamental needs of construction clients

Needs	Description
Function	This refers to the intended use of the project. The project must fulfil its intended function and this is one of the reasons that encourages the client to embark on projects. The function may be simple or complex, nonetheless it must be satisfied.
Safety	This embraces two concepts namely safety of the project during construction and safety during its operating life. These two aspects are important to clients.
Economy	The project must be of least cost. Clients want to spend as little as possible to satisfy their needs.
Running / maintenance cost	This refers to cost during the operating life of the project, it is related to 'economy' above. Clients want to achieve a minimum total cost i.e a balance between first cost with running / maintenance costs.
Flexible to uses	This refers to the adaptation of the building to different uses as the need may arise. Economic circumstances may forced a client to change the use of his building.
Time	This refers to the time available for the completion of the project, most clients want their project as soon as possible.
Quality	This refers to conformance of established requirements. A building either does or does not meet the requirements. Clients expect their building to achieve a minimum standard of quality.

2.4.2 Exercising authority over the organisation

The client should be in charge of the organisation of the project. One way to do this is through regular meetings and reports which would reinforce the client's need to be informed at all stages of the project. The client involvement in this aspect depends on the size of the project. Meetings and reports are essential to clarify any aspect of the project to the participants and to resolve any conflict.

2.4.3 Establishing the project culture

The project culture is difficult to define (Kakabadse et. al., 1988), nevertheless, this is an important aspect of the project; particularly in terms of cultivating consensus decision making amongst the project team members. Participative decision making causes individual to be more responsible because they are part of the decision making body (Cleland and King, 1983).

2.4.4 Selection of occupants for the main roles

This is one of the most important roles of the client. In most client organisations, an in-house project manager is usually appointed by virtue of his/her position in the organisation (Weng, 1990); rather than on experience, skills and knowledge. More often than not, in-house client's representative / project manager lack knowledge of design and construction procedures as highlighted by the Wood Report (1975). Today, they are more knowledgeable.

For the selection of consultants and contractors, NEDO (1974) encouraged clients to consider the following factors: size of firm, experience, senior people in charge, business efficiency, employment practices, quality of work, and cost.

2.4.5 Defining the main outlines of the project organisation

This will vary from one client organisation to the other and involve the setting up of formal project procedures such as participation at meetings and writing of reports which would create an interface between separate operations of the project such as design and construction. Usually a single person should be appointed to provide an interface between the client and designer (Wood Report, 1975).

Weng (1990) carried out a study to determine the importance of the client roles discussed above and arrived at the following with the most important role at the top:

1 Providing primary objectives.
2 Exercising authority over the organisation.
3 Establishing project culture.
4 Selecting role occupants for the main roles.
5 Defining the main outlines of project organisation.

However, this result can not be generalised because of the limited nature of the sample studied.

2.5 The changing nature of the construction client

The construction client has changed considerably over the last twenty years. In previous decades, the client was regarded as naive, inexperienced and uneducated in construction matters but nowadays, clients are generally more experienced (Gunning and Courtney, 1994). In fact, some clients are very experienced and sophisticated in construction matters such as speculative developers who are generally subsidiaries or disbanded members of construction companies. Major commercial clients such as Marks and Spencer Limited, Tesco, Safeway, Sainsbury etc. have sophisticated systems in meeting their building needs (Bryant et. al., 1969).

Clients now routinely seek services; such as: maintenance cost estimate, post-occupancy evaluation, building diagnostics, space planning, facade architecture, just to name a few, for lesser fee ("The", 1994). This means that construction consulting firms are operating on a tight margin which make survival, not to mention growth, difficult.

2.6 The consultants

2.6.1 Who is the consultant?

For the purpose of this thesis, the consultant is defined as follows:

"The consultants are the architects, engineers, quantity surveyors, project managers and other specialists who interprets the client's requirements into specific proposals, prepare instructions

for the builders and generally make all the decisions for carrying out of the projects. They may all be in one organisation or may be members of a number of organisations (Bryant et. al., 1969)."

Normally the consultant is independent of client organisation.

2.6.2 The needs of construction consultant

Like any business organisation, construction consultancies have their own needs and requirements to fulfil when engaging in construction projects; which may even conflict with that of the client (Cherns and Bryant, 1984). The needs include the following:

Profit making

This refers to profit made after tax deduction and since consultancies are in business, they have to make money to survive in the ever increasing competitive environment of the construction industry, to satisfy their partners and to be financially stable. This is not only important for growth reasons but more so 'financial stability' is one of the prequalification criteria used by clients in selecting construction firms (Russell and Skibniewski, 1988; Holt et. al., 1994). Construction firms should therefore reduce risk by engaging only in projects that maximise their profits (Handa and Goergiades, 1980).

Increased turnover

To construction consultancies, turnover is the income derived from the provision of services after deduction of discounts and before adding VAT and other taxes (Holmes and Sugden, 1990). Turnover relates to financial stability and a growth in turnover is an indication of survival and progress (Barback, 1984; Hutchinson and Dyer, 1987). Increase in turnover is important because the turnover history of construction companies is one of the prequalification selection criteria by clients (Holt et. al., 1994; Russell and Jaselskis, 1992).

Maintain a positive cash flow

Cash flow is a statement classifying receipts and payments into operating, investing and financing activities, and reconciling their effects on beginning and end cash positions, as

shown by the opening and closing balance sheets (Holmes and Sugden, 1990). Cash flow also relates to financial stability and is largely dependent on prompt payment of invoices by clients. Payments delays by clients is one of the main causes of bankruptcies of construction companies (Dun and Bradstreet, 1986; Besong, 1992).

To have a good image / prestige

Construction consultancies portray good image to their clients by diligently working on projects and through membership of trade / specialist associations such as Association of Consulting Engineers (ACE), Royal Institute of British Architects (RIBA), Institution of Civil Engineer (ICE) etc. This requirement is particularly important to construction consultancies because it is among the prequalification criteria used by clients in selecting contractors and consultants (Russell and Skibniewski, 1988; Holt et. al., 1994).

Clarity of clients' needs

In order for construction consultancies to adequately satisfy their clients, they demand that construction clients should clearly state their needs. This is done through the briefing process where the client is expected to play the leading role (Kelly et. al., 1992; Kometa et. al., 1995a). Many publications exist to help the client towards this end (Cherns and Bryant, 1984; NEDO, 1974).

Working at full capacity

Construction consultancies would like to operate at full capacity in order to keep all personnel busy and generate most needed income. Operating at full capacity needs diversification and a sound corporate strategy (Lansley, 1987).

Client satisfaction

We have already mentioned this requirement in our discussion of the other requirements above. A sure way for construction consultancies to maintain a competitive edge is to have a "large appetite" to satisfy the needs of their clients. This implies the development of an awareness of client commercial needs and market opportunities (Lansley, 1987; Halpin et. al., 1993).

High quality design

Construction consultancies take pride in producing high quality design. This is good for their business survival as clients' levels of satisfaction with the quality of previous works is among the prequalification criteria used by clients to select consultants and contractors (Russell and Skibniewski, 1988; Holt et. al., 1994). To provide high quality design, the consultant need competence and a high degree of expertise; acquired through experience.

For construction consultancies to satisfy these needs they have to undertake some responsibility in the construction process when engaging in projects.

2.6.3 The consultants role in the construction process

The consultant just like the client has a role to play in the construction process. This is particularly advantageous to the consultant because a successfully completed project promote the image of the firm. The most important role of the consultant is to work in an atmosphere of trust and confidentiality with the client. It is appreciated that each and every project is unique and so, therefore, are the roles of the consultant in particular and the parties involved in general (Lock 1987). The role of the consultant as treated in this thesis is very general and is therefore, applicable to all projects. RIBA (1980) and CIOB (1980) has written a lot about the consultant's role in construction projects. Some of the issues that they identified are discussed below.

Working with the client, the consultant should assess the needs and requirements of the client. This involves the accumulation and ordering of general and specific information related to the project at hand; the investigation of the nature of the problem; the investigation of possible solutions or means of solutions; the development and refinement of one or more of the tentative solutions isolated; and the proper communication of one or more of the solutions to people inside or outside the design team.

To solve the client problem, the consultant may have to look at the original source of the problem, i.e in our case what really influenced the client to decide to build. Once the original aim to build is established, the consultant will be put in a better position to help the client

achieved his/her needs and requirements. To understand the client's original aim to build may involve a complete study of the client organisation by the consultant. In this respect, the client and the consultant will have to work closely together as mutual interest is at stake. Once the original intention to build is established, all the consultant has to do is to see that the project is properly designed and constructed. To achieve this, the consultant has to accomplish the following tasks: provide economic advice to his/her client or to make sure that such advice is made available; ensure that the client is well informed and organised to provide the necessary information at appropriate times; make sound decision that will be adhered to; contribute particular architectural skills; take the necessary action on unplanned eventualities; ensure that appropriate professional skills are available; ensure that everyone understand their responsibilities; visit site regularly to inspect generally the progress and quality of the work and to determine in general if the work is proceeding in accordance with the contract documents; manages the project without prejudice to the needs of the client; appreciate his/her limitation and that of his/her staff; management of design work up to the contract stage; manages the whole project on behalf of the client from the time before any formal project commissions are given.

Because of tighter bids required by clients ('Interview', 1995), consulting firms are finding it more and more difficult to provide these services to construction clients.

2.7 The relationship between the client and the consultant

By discussing both the client and the consultant's roles in the construction process as above, a relationship between the client and the consultant can be deduced. As mentioned earlier, the consultant is usually the first to be approached when the client has a building problem, particularly on the traditional procurement route. The consultant is approached to solve the client's problem for a fee. The relationship between the client and the consultant is shown as illustrated in Figure 2.1. A client may engage a single or several consultants depending on his/her needs.

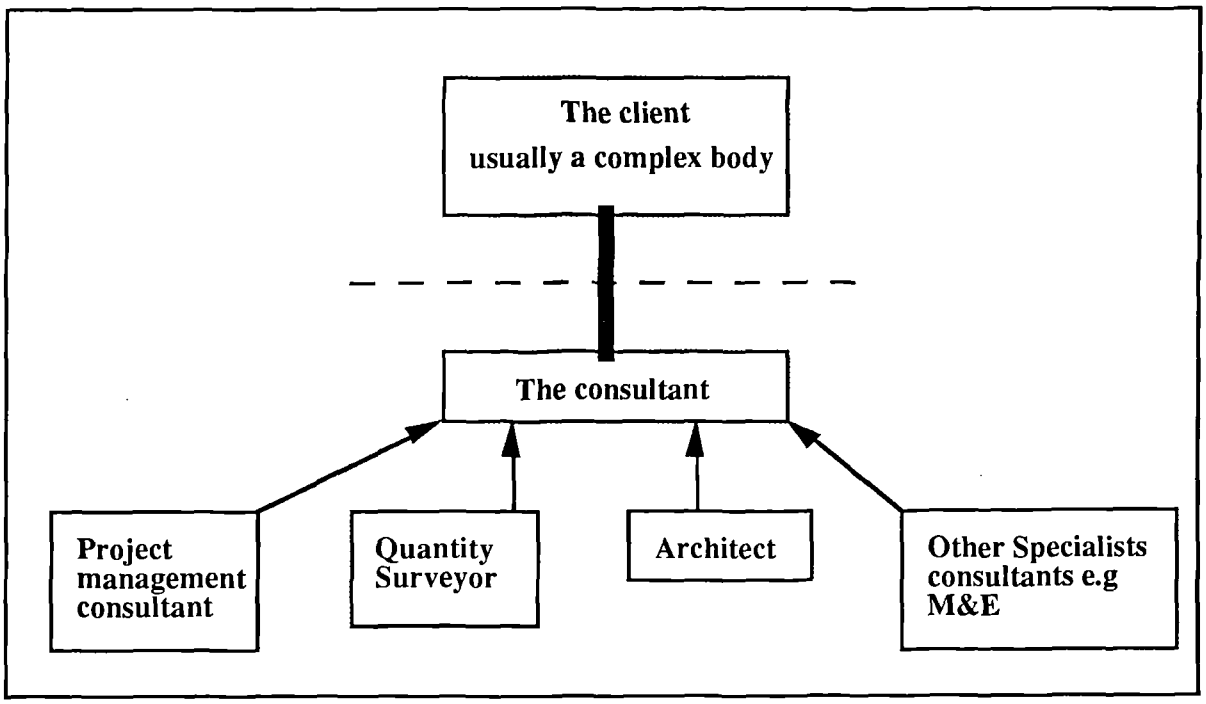

Figure 2.1 Client / Consultant Relationship

In Figure 2.1, the rectangles represent different people (or interest groups), and the horizontal broken lines represent the boundaries between different phases i.e from the time the client has an internal problem (in need of a building) to the time he/she engage a consultant. The heavy vertical line represent communication links.

It should be appreciated that not all engagement between the client and the consultant would lead to successful conclusion. Several investigations (which will be highlighted throughout this thesis) have been conducted to safeguard the client interest; but the reverse is not true for construction companies, particularly consulting firms.

2.8 Summary

The following points summarise this chapter.

1 Several parameters such as size, primary, secondary, experience, sophistication, etc. are used to classify clients. In fact, many authors have put forward various classifications of clients.

2 The construction client is a complex body that has been over simplified; leading to

difficulties in appreciating his / her needs.

3 The needs of clients are ever increasing and changing; clients are demanding more and more services from consultants for a lesser fee.

4 Construction clients nowadays are more experienced and educated in construction matters compared to clients of the previous decades.

5 Construction consultancies are business institutions that have their own needs to meet when engaging in projects.

6 Meeting clients needs has understandably been given prominence; but shouldn't consultants' needs be met as well? This is the focus of this research.

CHAPTER 3

CHAPTER 3
A CRITIQUE OF CURRENT CLIENT EVALUATION PRACTICE

3.1 Introduction

The preceding chapter looked at both construction clients and consultants in detail, discussing their various needs and roles in the construction process. It was made clear that not all engagements between the client and the consultant successfully leave both parties happy. The interests of construction client are given greater priority with little or no attention to the consultants'. This chapter examines how the construction client may affect the commercial viability of consulting firms; and the current methods being used by construction consultancies in tackling the problem. The first part of this chapter establishes the basis for evaluating the client organisation.

Career as a project consultant can be rewarding for those willing to excel in their area of expertise. However, consultants take on board a substantial amount of responsibility which may involve more risks than the usual commercial considerations of running a business. The nature of construction consultancy services and the unique features of the construction industry exacerbate this problem. It is not unusual for clients to demand more services for less fees; in many cases creating situation where the consultant is exposed to 'claims' exceeding the value of the services.

Many investigations and models exist in construction literature to help clients select good contractors and consultants for the execution of their projects (Russell and Ranasingh, 1992; Russell and Skibniewski, 1988; and Holt et. al., 1994). On the contrary, few attempts have been made to study the risks clients pose to consultants. Clients' actions before, during and after projects impact on the commercial viability of construction consulting firms. Records show that consultants and contractors who work for 'risky' clients often experience financial damage. In fact, the construction client has been identified as one of the major causes of business failure in the industry (Dun and Bradstreet, 1986).

3.2 Basis for studying consultants' risk exposure to construction clients

In the construction industry, clients in general have to select consultants and contractors to bid for projects, hence the plethora of contractor selection methods in literature. Corporate clients to the industry have the capability and resources to select the best participants for their projects. Apart from this, as mentioned in chapter 1, the corporate client brings an array of his own specialists to a project which may include technical specialists, building specialists, and operating personnel. Surely, the power exercised by big corporate clients (mainly for their own interest) should be of some concern to construction providers notably consultants and contractors. The capabilities of consultants and contractors in satisfying the needs and requirements of big corporations have been well investigated (Russell and Skibniewski, 1988; and Holt et. al., 1994). Why has a similar exercise not been performed to examine how big corporations in turn satisfy the needs and requirements of consultants and contractors?

Big corporations can manipulate construction providers to their own advantage. For instance, they can either act as clients or patrons depending on the circumstances. They are aware of the benefits of both and try to gain the advantages of both roles by sponsoring some buildings as patrons and other buildings as clients. Gutman Robert (1985) in his article 'Patrons or Clients?' put it rather nicely:

> " Contemporary American corporation provide extra funds and hire architects well known for their design ability when the program is a corporate headquarters, but employ less artistic firms for manufacturing plants, warehouses and distribution facilities, and regional headquarters."

Construction clients have changed over the years especially the experienced ones with consultants facing fundamental changes not only in the nature of their clients but also in the way in which their work is done. This is more conspicuous in the plethora of procurement methods in the industry; some of which are complex and caters more for the client needs. Complexity breeds errors which can be costly and of long term consequence. These changes in clients / procurement methods should be treated with caution. A good example are property developers, as mentioned earlier, are often disbanded subsidiaries of construction companies who are very sophisticated and experienced in construction matters. They are contractors

turned developers. They are not the traditional clients known to consultants.

The developer is profit orientated and tends to evaluate his projects on financial terms and customer satisfaction. The developer may not be interested in the project per se but on the revenue from the project. He may not be concerned with the values the building provide but with the price the purchaser will be prepared to pay for them. His transaction is a short term one; he needs to take account of future cost only to the extent that his customer will take note of them. For instance, if the customers ignore running costs, durability and future changes in requirements; they may also ignore such factors and can aim at minimising initial costs in relation to the client's valuation of the immediate worth.

With the developers being more profit motivated, it could easily be recognised why he may be posing the greatest risk to the commercial viability of consulting firms. This is more conspicuous considering the collapse of the Canary wharf project developer - Olympia and York. Barclays Bank lost £242 million in 1992 mainly because of bad debt provisions for loans to the property developers during the economic boom of the 80's. Also, consultants and contractors who were involved in the development incurred heavy loses, which might have been avoided or at least reduced to manageable proportions if a detailed analysis had been carried out on the developer before embarking on the project. The outcome of this research may help inform consultants / contractor of risky clients, by providing a better understanding of construction client, their attributes, requirements, and role played in the construction process.

Client's impact on project performance refers to the client influence on the success or failure of a project while client's impact on the consultancy refers to the client influence on the long term commercial viability of the consultancy. Client impact on project performance will impact on the consultancy in that a poor project performance will affect the image and reputation of the consultancy; this will make other clients reluctant to employ the consultancy, in turn affecting their long term commercial viability.

3.3 Studies on client performance

Different authors and organisations have studied client performance in the construction process and concluded that client performance influences successful project execution which in turn affects the performance of the participants (Weng, 1990). The structure of the client company determines how the project is organised, it's participants, responsibility of the parties involved, criteria for feasibility; and the overall performance of the project depending on these very factors. Understanding the client is clearly necessary in light of the repercussions of their actions on the business activities of the project consultant.

The Construction Industry Institute (CII, 1990) recommended certain principles for use on construction projects (see Table 3.1). The institute investigated construction owners to establish the degree of utilisation of these principles on owner projects and arrived at the following conclusion:

-owner project managers lack strong management skills and experience;

-the level of utilisation of CII principles is strongly determined by project size and managerial qualities of managers;

-higher level of utilisation of these principles improve project performance;

-many economically attractive and proven practices are receiving only moderate utilisation;

-one of every three projects is over budget or behind schedule; and

-small projects may benefits most from increased utilisation.

What is surprising is the complete lack of investigation of the influence of none usage of these principles on the performance of construction firms. In the UK, Bresnen and Haslam (1991) investigated client project management practices and attempted to highlight clients' experience that "*... the industry is one in which there are a sizable number of regular clients whose average project is one in which they have considerable experience. Such clients typically manage a fair-sized portfolio of projects varying in scale and type, and will often have some in-house capacity and well-established mechanisms and procedures for handling them...*" This is a good attempt at correcting the simplistic view held of clients in the industry. However, the main conclusions from their investigation are that:

- **client variables** (client type, size and experience);

- **project variables** ('one-off' or phase, site location, new or refurbishment, typicality (size), typicality (type) and project complexity);
- **Organisational variables** (management set-up, whether 'normal' practice and location of design team); and
- **contractual variables** (contractual system, whether 'normal' practice and previous experience of contractor)

influence project performance particularly in terms of time and cost performance. An extension of their investigation would have been to examine how these variables influence the performance of construction firms and possibly their commercial viability. Construction researchers have always fallen short of examining the client to any degree with an apparent vacuum in construction literature on this all important subject.

Odusote and Fellows (1992) investigated the importance of resource considerations when contractors make project selection decisions and concluded that 'the ability to pay for the cost of the work' is the most important factor contractors consider when making project selection decisions highlighting the fact that construction companies concentrate mainly on financial stability when evaluating their clients. On a similar line, Shash (1993) investigated factors considered in tendering by top UK contractors and identified 55 factors influencing bid/nobid and markup size decisions. 'Owner/promoter client identity' was among the factors identified ranking 5th for the bid/nobid and 7th for the markup size decision out of 55. Surely, 'client identity' is worthy of further examination.

Table 3.1 Project management categories of Construction Industry Institute (CII) / Construction Industry Cost Effectiveness (CICE) principles and recommended practices

Management category	Scope statement
Strategic project organising	This category focuses on principles / recommendations related to project organisation, establishing objectives, scope definition control, establishing communications / information processes, and constructability planning.
Contracting practices	This category focuses on those principles / recommendations related to contracting strategy (planning, packaging, etc.) and the utilisation of specific contract provisions and/or clauses for contracts controlled by the initiating party.
Design effectiveness	This category covers principles / recommendations relevant to the evaluation of design effort, incorporating constructability concepts into design, and control of design activities.
Project control	This category focuses on principles / recommendations related to control integration, decision making, scope control, control techniques, and estimating practices.
Management quality	This category is concerned with principles / recommendations related to the implementation of quality assurance / quality control and the documentation of quality effectiveness.
Material management	This category focuses on those principles / recommendations related to planning and utilisation of materials management on projects.
Human resource management	This category is concerned with principles / recommendations related to the quality of site supervision, field work force motivation, training, and site labour practices (substance abuse, overtime, etc.).
Safety	This category covers principles / recommendations related to safety communications, specific practices, and management attitude toward safety.

Adopted from CII, 1990; (Table 2).

3.4 Client-generated risks to consultants

The following sub-sections highlights client-generated risks to construction firms in general and construction consulting firms in particular.

3.4.1 Risk of late payment

Through their requirements and actions construction clients invariably pose risks to the commercial viability of consulting firms; notably the risk of late payments which is very common in the industry and has driven many construction firms to the edge of bankruptcy. This depends on client type and the relationship which the firm has with the client in terms of how long they have done business together. The private sector clients and developers in particular are considered generally the most difficult to deal with (Besong, 1992). To overcome this risk, consulting firms will have to remind clients of the payment delays; at same time being careful not to upset them to prevent future job prospects. This would require delicate balancing acts (Kometa et. al., 1995b).

3.4.2 Risk of project termination / client insolvency

Termination clauses in contracts also pose the risk of project termination to consulting firms. A client could terminate a job because of one reason or the other; under most engagement contracts based on the Association of Consulting Engineers (ACE) conditions the consultant could recoup some of the cost. Consultants are not covered in case of client insolvency. At best consultants become creditors to client's assets and may recoup losses after banks and other funding agencies have been satisfied by the liquidators. To mitigate the risk of client insolvency, Latham (1994) proposed a mandatory set up of trust funds to pay project participants should the client become insolvent. Obviously, it is prudent for consulting firms to take effective precautions to avoid these risks possibly through insuring against client firms going bankrupt. However, premiums are likely to be high and there is doubt if underwriters will issue such policy.

3.4.3 'Fitness for purpose guarantee' risks

Consultants may also face substantial risk in situation where clients demand 'fitness for purpose guarantees' for design work. Such catch all clauses can be interpreted to mean

anything and therefore consultants face high risk from such clauses and are likely to refuse engagement contract containing such clauses because Professional Indemnity Insurance will not cover them for giving fitness for purpose guarantees. The Association of Consulting Engineers (ACE) is likely to support firms who will not engage in such contracts. Indeed coverage against liability for fitness for purpose is virtually unavailable (Ndekugri and Turner, 1994). The consensus of opinion is that for such clause to refer to entire buildings would be untenable. The only test case to the author's knowledge concerning 'fitness for purpose' refers to the implicit requirement that the floor slab for a warehouse should be level enough for a forklift truck which seems perfectly reasonable. However, it is less reasonable to extend this principle to an entire building, where different stakeholders will inevitably have different points of views, which may well also change over time.

3.4.4 Risk due to advice given to clients

By nature of their job, consulting firms give advice to construction clients as part of their duty under laws of contract and tort. Situation may arise where the client is not wholly satisfied with such advice; the fees charged by professionals are usually a tiny fraction of the potential loss that could be suffered by the client in the event that the professional's advice is incorrect (Chappel, 1994). Therefore, risk due to any advice given to clients could involve substantial financial losses to consulting firms where the client sue successfully leading to decline of client confidence and the reputation of the firm. The main cause of this risk is related to the client type; obviously, the consultant and nature of advice is relevant as well.

3.4.5 Over reliance on some clients

Most consulting firms rely on repeat business and recommendation by clients for a large proportion of their work. Also, long term relationships with corporate clients are encouraged. This is good until things start going wrong for the client themselves as demonstrated by the investigation of Blau et al. (1983). In their survey between 1974 to 1979, they examined how economic decline in Manhattan, New York city affected architectural firms. They found that many architectural firms were too closely tied to this particular metropolitan environment even though it meant a high risk of failure. For the firms that were less dependent on the city, relocation was a reasonable option. Their survey indicated that over reliance on some clients

without continuous assessment of the client's situation can lead to a firm's decline and death, when clients themselves are in some difficulties.

3.4.6 The relative size factor

Generally, client organisations and particularly corporate clients are bigger than consulting firms; by nature construction consultancies are small. The contracting side of the industry is also made up largely of small firms and a small number of large firms. While the larger firms can sometimes have some leverage on clients, the smaller ones simply depend on them for survival. This relative size factor may explain some recent failures of small subcontracting firms who had gone under simply because the 'big brother' did not pay up and a subsequent cash flow problem.

3.4.7 Risk at the briefing stage

Construction clients are expected to make their project priorities clear to consultants at the briefing stage. It would be rather simplistic to expect the client to bear all the responsibility to make clear his project priorities at the briefing stage. Latest opinion sees the processes of briefing and designing to be iterative and interdependent. Many clients are unable to articulate their requirements until they have inter-acted with designers. Briefing is often seen to be a dialectic debate amongst client representatives and designers which is inseparable from the initial stage of design. Managing this process is a big problem and any ambiguity would pose risks to consultants. Current thinking in construction literature is that 'partnering' will reduce such ambiguities (Carr et. al, 1991).

The preceding paragraphs have reviewed a number of important reasons why construction clients pose a risk to consulting firms. What is surprising is that client evaluation as a potential area of risk assessment is currently lacking in literature despite the fact that construction clients have been identified as one of the major causes of business failure in the industry (Dun and Bradstreet, 1986). Clearly this aspect fits into the general subject area of risk management in the construction industry and its omission in previous works may account for some of our lack of full understanding of the risk management subject in the industry.

3.5 Current client evaluation practice

Existing literature (Odusote and Fellows, 1992; Kometa et. al. 1994a) supported by informal interviews with practitioners from three local Architectural and Quantity surveying firms confirmed the predominance of 'financial stability' in current client evaluation practice with the most common evaluation methods identified as:

(i) financial checks made through specialist agencies;

(ii) credit checks and business performance carried out by independent financial consultants;

(iii) bank references, published accounts and market information;

(iv) check on stability and history of client company; and

(v) questioning other consultants who have worked with the client before.

It is the contention in this thesis that while 'financial stability' may be of paramount consideration it is not the only client attribute impacting consultants' performance. To establish a complete profile of a client would require comprehensive examination of all his organisational attributes (see Chapter 4).

3.6 Summary

1 It is prudent to evaluate client-generated risks to consultants particularly as record show that firms who work for 'risky' client often suffer financial damage.

2 Current client evaluation practice is limited to client financial stability only with little input on other equally important client attributes.

3 Many investigations have been conducted to help clients select the best consultants and contractors for the execution of their projects. On the other hand, little or no investigations have assess how clients themselves may influence the performance of consulting firms.

4 Client attributes influence the successful execution of construction projects and the commercial viability of construction firms particularly project consulting firms. Multi-attribute client evaluation could provide a significant leap forward to fuller understanding of all project participants including the client.

CHAPTER 4

CHAPTER 4
RESEARCH METHODOLOGY

4.1 Introduction

The last two chapters have brought about some understanding of both construction client and consultant including their roles in the construction process. Based on the literature findings in these two chapters, and the literature review presented in this chapter, we shall build up a statement of the hypothesis on which this dissertation rests. We shall also discuss the experimental procedures and techniques adopted for establishing the relationship between construction clients and the potential risks pose to construction consultants. Other specific areas of research: variables identification, data collection and the subsequent data analysis procedures are all discussed in this chapter. We start with variables identification.

4.2 Variables identification

In this section of the thesis, variables influencing the client to build, the client's responsibilities in the construction process and client's attributes affecting the performance of consulting firms are examined.

4.2.1 Client variables

For a study of this nature, it is normal to first identify variables influencing the client decision to build and their responsibilities in the construction process before identifying client's attributes affecting consultants' performance.

4.2.1.1 Variables influencing the client to build

Marketing researchers and professionals are well advanced in studying consumers buying behaviour. The multitude of factors which determine consumption have been identified (see Fig. 4.1). Acting together, these factors influence consumers buying behaviour. The same line of reasoning has been adopted to try to understand the variables influencing the client's decision to build. From both marketing and construction literatures numerous factors influencing the decision to buy was identified. It is recognised that construction products are very different from other commodities, particularly as they are purchased before they are

The consumer buying behaviour is a function of:

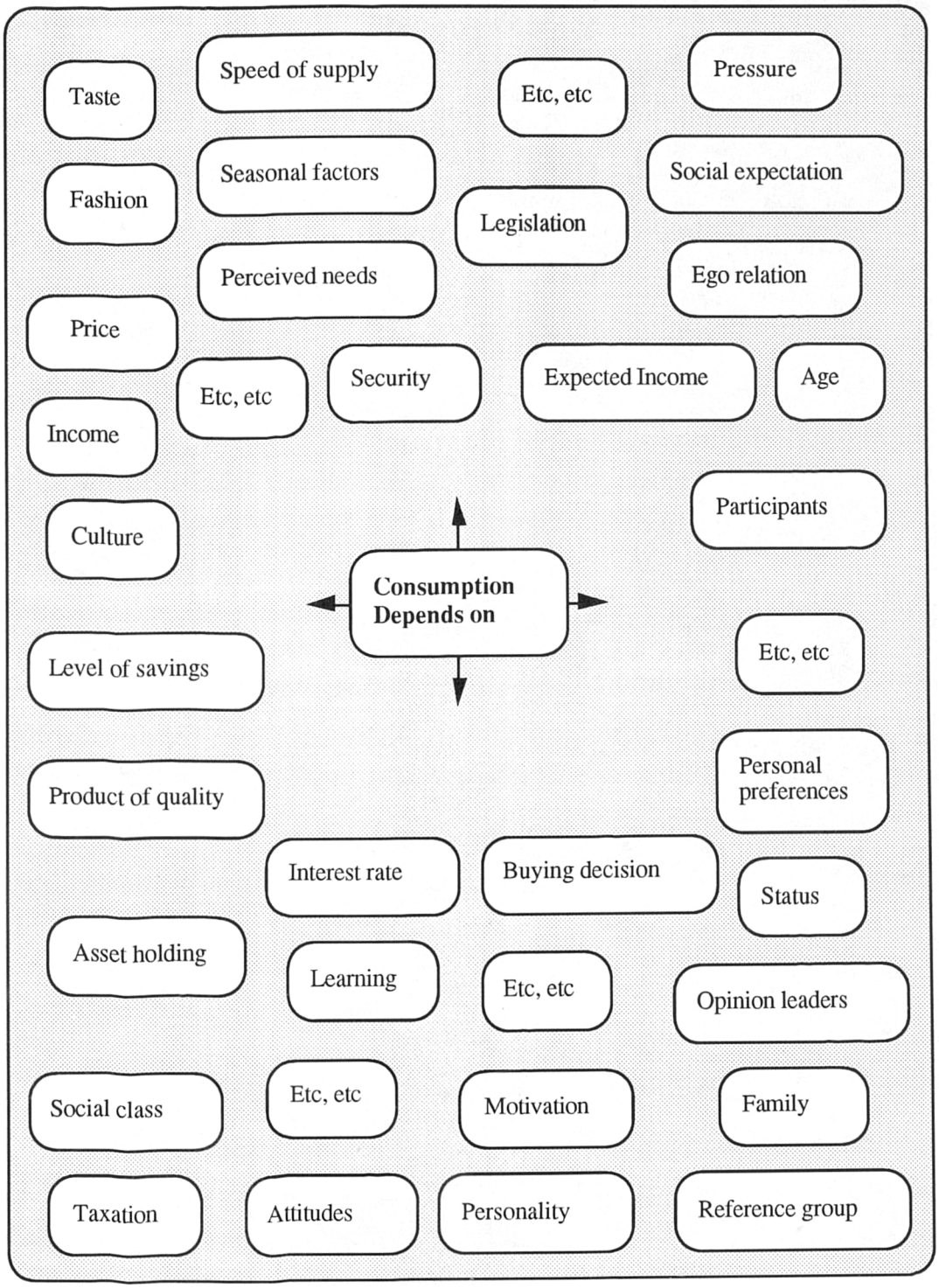

Figure 4.1 Summary of variables influencing consumer buying behaviour (Martin, 1983)

designed or built; the following variables were therefore found to be more relevant to construction clients. These variables were confirmed at the preliminary stage of the research by seeking the views of some construction clients.

Cultural influence

Culture refers to something that is more stable and enduring, i.e the set of key values, beliefs, and understandings that are shared by members of an organisation or society at large and can enhance the stability of the organisation and help members interpret organisational activities and events. Culture in an organisation influences most decisions, for instance, cultural changes in architecture on client's choice of new buildings, seen in the type of buildings such as Gothic architecture to Post-Modernism architecture (Trachtenberg and Hyman, 1986). Cultural changes within and without the client organisation influence the decision to build.

Change of attitude

Attitude is simply the positive or negative feelings held towards an object. Attitudes are involved in almost every aspect of organisational life, influencing most decisions including the decision to build. Attitude change involves the addition, removal, or modification of feelings towards the object. Baker (1988) demonstrated how attitudinal change affected performance on projects.

Users' preference

Refers to individual choice within the organisation, often reflected in work and usage of organisational assets, i.e productivity. McElroy's (1984) series of articles on 'How Big Corporations Choose Design Firms', demonstrated the importance of user groups in the design process. The views of eventual users of a building are not usually considered (Bryant et. al., (1969).

Social expectation

Just as individuals have different tastes and lifestyles, construction clients also have their own social categorisations, reflected in the sort of construction products to be purchased. Social issues such as education, occupation, environmental sensitivity, etc. have some influence on client organisation (Halpin et. al., 1993).

Director's preference

Organisations generally have a hierarchy of authority, with those at the top often taking the most influential decisions. Knowing the preferences of top management is advantageous. Gutman (1985) demonstrated that large corporate projects with perceived good architecture have often correlated to the chief executive taking a personal interest in the project.

Status/prestige

Reflects the self esteem of construction clients. Some clients embark on projects just for status/prestige and the need for recognition by others through their buildings. Common in America where corporations provide extra funds and hire architects well known for their design ability especially when the programme is the corporate headquarters (Gutman, 1985).

Corporate ego

Like status/prestige, ego manifests itself through esteem, i.e the need for respect.

Workers' pressure

Simply refers to the pressure that employees place on top management for the provision of better facilities to improve the working environment.

Location, Need for more facilities, and Profit/economic reason

All three variables are self explanatory.

4.2.1.2 Client's responsibilities in the construction process

The client's role in the construction process was discussed in chapter 2 under five main headings after Bennett (1985). An extensive investigation was carried out by Morris and Hough (1986), they identified 80 factors that are important for the success of major projects which can be grouped under 10 headings listed on Table 4.1; these factors included the client's roles identified by Bennett. These factors have been adopted as representing clients' responsibilities in the construction process and are very general and applicable to most projects.

Table 4.1 Client Responsibilities

Responsibilities	Description
Project definition / formulation	This refers to dialogue between the client organisation and the consulting firm in which the client makes a reasonable effort to ensure that he/she define / formulate the project properly.
Planning and design	This refers to the in-house planning and design that some clients undertake before approaching a consultant or contractor.
Politics / social factors	This refers to fiscal policy, safety and employment regulations and community factors. The client should be aware of these factors and take precaution to accommodate them.
Schedule urgency and Schedule duration	These two responsibilities are treated together because they deal with schedule issues. 'Schedule urgency' refers to clients instilling the required degree of urgency in his personnel i.e avoid rushing by all means and on the other hand discouraging delays. 'Schedule duration' refers to the overall time allocated by client for the practical completion of the project.
Finance	The client should ensure a stable source of funding of the project. Funding of the project is the responsibility of the client.
Legal agreement	This refers to client's responsibility in ensuring that participants to the project are committed to making the contract work rather than getting involved with litigations.
Contracting	This refers to the client's knowledge of the available procurement routes and contract forms which are important for project success.
Project implementation / management	It is the client responsibility to determine how the project should be implemented / managed which bears on the successful execution of the project.
Human factors	This refers to the selection of the right people for the project.

The factors represent some features inherent in projects that are controllable by clients, because of this, it may improve the performance on projects if these factors are presented as clients' responsibilities. Responsibility simply refers to the measures or actions clients have to take in order to satisfy their project's needs.

4.2.1.3 Client's attributes affecting consultants' performance

Client's attributes affecting the performance of construction consulting firms as identified from both the American and British literature are now discussed.

Financial Stability

The literature identified this as an important attribute motivating consultants to embark on a client's project. The consultant would be concerned that the client has the necessary funds to see the project through. Just as in any business organisation financial stability of a construction client's organisation depends primarily upon the following sub-attributes: current assets, credit-worthiness and current liabilities (Foster, 1986).

Project Feasibility

The feasibility of the project is an incentive for the consultant to work more confidently. Many clients embark on projects without paying enough attention to its feasibility. The feasibility of the project depends on the site conditions, client contribution to the feasibility study, client determination of project priorities and client appointment of personnel to be in charge of the feasibility study (Corrie, 1991; NEDO, 1974).

Quality of Management

This refers to the managerial competency and quality of the client's organisation. The better this is, the more confident the consultant will be when working with the client. The quality of management within the client organisation is a function of client experience with project management, the qualifications of personnel, project auditing and quality assurance practices.

Organisational Quality

This simply refers to the degree of competence the client exercises in assembling the project.

Project consultants will be very confident working with clients who are very experienced in this matter. Organisational quality depends on the client's organisation of the project team, the coordination of the project interphase and the allocation of project responsibility (NEDO, 1974; CIOB,1980).

Past Performance

Most consultants prefer to work for clients with an established track record on past performance. Past performance depends on client cost performance (e.g cost overrun due to design changes by client), client time performance, quality achieved, number of successful and unsuccessful projects completed (Mohsini and Davidson, 1992). Efforts by clients to improve project performance have largely been concentrated on contract documentation; see Naoum and Langford (1987) for management contracts and Rowlinson (1987) for design and build contracts. Client firms are yet to examine the impacts of their own performance on achieving project objectives.

Past Experience

Relevant past client experience of the type/size of proposed project would be an incentive to consultants. Past experience depends on the number of projects completed, the types/sizes of project, client involvement with construction activities (e.g interest in the latest construction technology) and experience of client personnel (Russell and Skibniewski, 1988).

A client may have been involved on a similar type/size of project in the past and performed poorly. While his/her experience on similar current project may be substantial from knowledge gained in the past his/her performance in terms of time, cost and quality may still be questionable since each construction project is unique.

Client Characteristics

This refers to features of the client company such as type, size, structure, communication channels and litigation tendency. These features would influence the consultant's performance.

Client's Duties

As already mentioned, Morris and Hough (1986) identified 10 'success' factors which should be present for any major project to be successfully executed. These factors have been adopted and formulated to represent the client's duties (responsibilities) from the consultant's point of view. They are very general and are applicable to most projects. The duties and interest of a client who is actively involved in the project will include: project definition and formulation, project finance, contracting, legal agreements, human factors, project implementation and management, politics and social factors, schedule urgency, schedule duration and planning (See Table 4.1).

Project Characteristics

This refers to the features of the project including type of project, size, cost, complexity, objectives and sub-objectives, time and location. These features would affect the consultant's performance (Corrie, 1991).

Current Market Condition

A study like this will be incomplete without looking at the condition of the economy. This refers to peaks and troughs in construction activities. The attitude of clients during these time would affect the performance of consultants. All the client attributes and sub-attributes influencing project consultants' performance are summarised on Table 4.2.

Table 4.2 Client related attributes and sub-attributes influencing project consultants' performance

Financial Stability
- Credit-worthiness
- Current ratio: -Current assets
  -Current liabilities

Project feasibility
- Feasibility study
- Project priorities
- Personnel appointment
- Site condition

Quality of management
- Project management
- Qualifications of personnel
- Project auditing
- Quality assurance

Organisational quality of client
- Organisation of project team
- Coordination of project interphase
- Allocation of project responsibility

Past performance
- Successful projects
- Unsuccessful projects
- Cost overrun
- Time overrun
- Quality achieved

Client characteristics
- Type of client
- Size of client
- Structure
- Communication channels
- Legal history

Client's duty
- Project definition and formulation
- Project finance
- Contracting
- Legal agreements
- Human factors
- Project implementation and management
- Politics and social factors
- Schedule urgency
- Schedule duration
- Planning

Current market conditions
- Economic boom
- Economic recession

Project characteristics
- Type of project
- Size of project
- Cost of project
- Project complexity
- Objectives and sub-objectives
- Time
- Location

Past experience
- Projects completed
- Construction activities
- Types of projects
- Experience of personnel

4.3 Statement of the hypothesis

In chapter 2, we examined clients' needs on construction projects establishing that for clients to satisfy their needs, they would have to take a more active role in the construction process. The relationship between the client and the consultant was established.

In chapter 3, we learnt that while client needs have been well researched and documented in literature there is a paucity of investigations on consultants / practitioners. We also reviewed studies of client performance in the industry. These studies highlighted clients' attributes influencing the performance of construction companies in general and construction consulting firms in particular. The basis for studying client-generated risks to consultants was established and some of these risks were identified. It was also established that current client evaluation practice is adhoc and concentrate almost entirely on clients' 'financial stability'. Based on these the hypotheses for this work can be summarised as follows:

(i) financial stability is only one of many client organisational attributes and can not singularly give a complete profile of the client. If other client attributes are brought into client evaluation practice, a more complete picture of the client would be achieved;

(ii) the commercial viability of a consultancy could well depend on its ability to correctly / accurately evaluate its clients. Instead of the current adhoc approach the development of a systematic client evaluation framework would be helpful;

(iii) it is also hypothesised that the responsibilities of clients in the construction process as perceived by clients themselves and project consultants are similar; hence there is a basis for a systematic framework for evaluating construction clients.

To test these hypotheses, some experimental procedures are necessary. But first, which construction clients / consultancies are most suitable for testing these hypotheses?

4.3.1 Which construction clients / consultancies?

It is not possible to cover every construction client and consultancy in a research such as this. This is because it would be expensive and time consuming. The research therefore focuses on private consulting firms, public consulting firms and multidisciplinary integrated practice who offer civil and structural engineering services, building services, project management services and architectural services or a combination of these services. Clients evaluated are typically private sector clients who builds regularly, public sector clients and speculative developers. These category of clients represent a major proportion of the construction industry's pool of clients.

4.4 Questionnaire design

The experimental procedure adopted for this thesis involved questionnaire design and survey / interview of selected client organisations and consulting firms. The main tool for data collection were two structured questionnaires. This method of data collection was preferred to the others such as record inspection and observation because (i) information was required from a large number of individuals over a large geographical area; (ii) a lot of data could be gathered quickly within a specific time; (iii) it is relatively cheaper; (iv) it takes up minimum of busy staff's time; (v) data can be captured directly in machine sensible form; and (vi) it is exactly repeatable. However, this method of data collection has its disadvantages: (i) questionnaire design is difficult; (ii) to make follow up points is cumbersome; (iii) there is normally a poor response rate; and (iv) there is a risk of shallow replies. Within the context of this research the advantages outweighed the disadvantages. While record inspection may provide more quantitative and reliable data, documents may be out of date; information not immediately available in usable form; and may prove expensive in terms of analyst's time. Observation is obviously not suitable for this type of investigation and very expensive in terms of analyst's time. The variables identified from literature formed the basis of the questionnaire design. Two questionnaires were designed, one for clients and the other for consultants.

4.4.1 Client questionnaire

This questionnaire, which is presented in Appendix A, was designed to study the construction client using the variables identified from literature. The questionnaire was patterned after the Michigan Organisational Assessment Package (1975). At the design stage of the questionnaire

the following were addressed:

1 Variables to be measured.

2 The respondents to the questionnaire.

3 The purpose for each question was kept in mind.

4 The question sequence was carefully considered, starting off with some easy, impersonal questions until rapport has been well established.

5 Much effort was made to keep questions short and simple, giving clear and concise instructions.

6 Responses to questions were limited to either a tick or simply to encircle numbers with restriction to written responses.

7 Question-wording was chosen with care to ensure that they have roughly similar meanings to what the respondents is used to.

A covering letter describing the purpose of the survey was carefully written. The questionnaire sought general information of client organisation namely type, work capacity, average contract size and further descriptive information; and progressed to more specific questions about clients' decision to build, fundamental needs and responsibilities of clients. A scale of 1 to 7 was used to measure the effects of the variables, with 7 representing maximum effect. The designed questionnaire was then tested by means of a pilot survey. To encourage response to the questionnaire, respondents were promised summary report to the findings of the survey.

4.4.2 Consultant questionnaire

The procedure used to design the client questionnaire was adapted for the consultant questionnaire. This questionnaire is presented in Appendix B. Common questions were asked in both questionnaires in order to compare and contrast the views of clients and consultants. These included questions about clients' responsibilities in the construction process.

4.5 Sample selection

After the questionnaire design, the next step taken was to search for a sample of client organisations and consulting firms to reflect the variation within the industry. The clients and consulting firms surveyed in this research were selected as follows.

4.5.1 Clients

The survey sample for clients was selected from those listed in Business Alert Section of the Contract Journal over the last five years. Information on some clients and their projects are usually described in the Contract Journal. From this clients were selected ensuring that they were evenly distributed across the country to give a representative sample. Some public sector clients from all over the country were contacted directly. It was necessary to ensure that a good proportion of private, public and developer clients were selected. In each organisation, contact names were sought usually directors / managers in the private sector, architects / surveyors / head of departments in the public sector, and property managers in developer client organisations. Advice was also sought from the Royal Institute of British Architects (RIBA)(Clients' Advisory Services).

To augment the postal survey personal networks and previously established relationships with senior members of client organisations were tapped. The clients contacted have a continuous building programme including local authorities, churches, industries, universities, community organisations etc. To clarify survey findings, the client types were classified under three main groups namely: developer, private and public clients as described in chapter 2. As mentioned in chapter 2, developers are from both private and public sectors, treated separately because of their prominence and activities in the construction industry. In fact, one of the organisations who took part in the survey was a joint venture between private and public sector clients. In total 178 clients were selected.

Although the sample were not entirely selected randomly, sampling client organisations in this way was necessary because information on clients are usually confidential and most client bodies such as CIEC, BPF etc. are usually reluctant to devolve information about their members. Infact, convenience sampling seems to be the norm in investigations of client organisation and is not a deficiency in the context of this research (see Bresnen and Haslam, 1991).

4.5.2 Consultants

Consultants selected had completed several contracts within the last five years and all have

contracts currently in progress. To best capture the preferences of these firms, people questioned were either the owner, chief director or departmental manager. Various sources were considered and the consulting firms were ultimately selected from three main sources namely:

(i) New Civil Engineer consultant file, 1993;

(ii) Royal Institute of British Architect 1992/93 list of practices;

(iii) Association of Consulting Engineers' list (the selection here was limited to building services engineering, civil engineering, and structural engineering specialists).

For each consulting firm a contact name was sought, firms were selected from all over the country; the only criteria for selection was that the firm should have been in practice for a minimum of five years. The firm selected fall under the following category: private consulting firm, public consulting firm, and private multi-disciplinary / integrated practice (Newman et. al., 1981). In total a sample size of 300 consulting firms was selected.

4.6 The survey

After the sample selection, a pilot and a major survey was conducted on the clients and consultants. The pilot surveys for both clients and consultants were done simultaneously. The same procedure was adopted for the major surveys.

4.6.1 Pilot survey

4.6.1.1 Clients' pilot survey

This involved structured interviews with five construction client organisations. The purpose was to test the suitability and comprehensibility of the questionnaire. The questionnaire was modified after the pilot survey, factors were added and removed depending on which were deemed appropriate and applicable to the UK construction industry. The pilot and structured interviews were also used as a means to test the construct validity of the questions particularly those that deals with the needs, responsibilities, and influence on clients' decision to build. This is so because some of the questions were rephrased following feedback from the pilot survey and interviews.

4.6.1.2 Consultants' pilot survey

The questionnaire was tested on 30 consulting firms for comprehensibility through a pilot survey. As earlier mentioned the consultants were divided into private, public and multi-disciplinary integrated firms and were considered to be experienced because of the length of time they had been in the business and the number of projects they had completed. A standard letter briefly explaining the survey along with the structured questionnaire were sent to the respondents. This was later followed by a telephone call. All 30 consulting firms responded and were attracted because of the newness of thought. After the pilot survey, the questionnaire was then adjusted and modified following comments from the respondents. The modified questionnaire then formed the basis of a nation wide survey.

4.6.2 Major survey

Following the modifications to the two different questionnaires after the pilot studies, our next priority was to conduct major nation wide surveys.

4.6.2.1 Clients' major survey

The client questionnaire was sent out to the 178 client organisations selected from the above mentioned sources. After a 3 - 5 weeks lapse another batch of questionnaire was sent to those who did not reply to the first batch as a reminder. In total, 40 questionnaire were returned giving a response rate of 22.4% which is considered appropriate because of the nature of the information required and the lukewarm response to questionnaire surveys in construction generally.

4.6.1.2 Consultants' major survey

The consultant questionnaire was sent out to the 300 consulting practices selected from the above mentioned sources. After a 3 - 5 weeks lapse another batch of questionnaire was sent to those who did not reply to the first batch. In some cases the follow up was done by telephone calls. In total 115 questionnaire were returned giving a response rate of approximately 38%.

4.7 Data analysis

Data from both surveys were analysed using several statistical packages such as Statistical Package for the Social Sciences (SPSS), Statsworks and Minitab. The analysis was multivariate in nature. The following statistical techniques were employed:

1 Principal Component Factor Analysis.
2 Relative Index Ranking Technique.
3 Correlation Analysis.
4 Weighting Technique.
5 Statistics Using Ranking Technique.
6 Reliability and Validity Assessment Technique.
7 Sensitivity Analysis.
8 Simulation.

Each of these analysis technique will be fully explained and applied in the relevant part of this thesis as we move towards the main theme of this research.

4.8 Summary

This chapter has explained the basis of the hypotheses for this research and briefly explained all the variables ultimately identified. The chapter also explained how the experiments have been carried out in order to understand the analysis, discussion and findings in the next four chapters. Although client-generated risks to consulting firms is quite difficult to measure - because of the many attributes involved - a method to measure it based on the multi-attribute analysis technique has been devised. It is believed that the measuring technique aided by statistical analysis will enhance the understanding of the relationship between the client performance and the commercial viability of construction consulting firms. Let us now go into analysis and discussion of the findings.

CHAPTER 5

CHAPTER 5
CONSTRUCTION CLIENTS AND FACTORS INFLUENCING THEIR DECISION TO BUILD

5.1 Introduction

In order to understand client-generated risks to construction consulting firms, we first have to study certain aspects of the clients' organisations. In the preceding chapter we looked at clients as consumers of construction products and identified the variables influencing the decision to build. The need to build does not originate suddenly but builds up gradually; and the ultimate decision to build is influenced by many factors. In this chapter we shall discuss the results of investigations into client decision factors; their relative importance in influencing the client to build will be statistically evaluated and we shall test one of the hypotheses stated in the preceding chapter that client decision to build is determined by many factors.

Many investigations have been conducted on how construction clients communicate their needs and requirements to their consultants (Newman et. al., 1981; NEDO, 1974; Murray et. al., 1990; CIRIA, 1987), including studies by the Construction Industry Institute in USA (Laufer, 1989; Howell, 1990; Rowings et. al., 1987). Despite all these efforts, time and cost overruns, unsatisfied clients and other difficulties still continue to plague the industry. Notably however, few investigations appear to have considered socio-dynamic forces operating in the client organisation itself prior to developing the brief, an exception being Bryant et. al. (1969). Clearly an understanding of such influences would be of benefit to the consultant in particular and the construction industry in general. Clients' organisations need to be properly understood and their original intentions and motivations to build appreciated.

5.2 Project motivating factors

In chapter 4, we learned that marketing experts have long studied consumer buying behaviour in order to identify the factors that influence both the individual and the organisations' decision to buy (Chisnall, 1985; Kohli, 1989; Robinson et. al., 1983; Sheth, 1973).

While it is recognised that construction products may be different from other commodities particularly in the method of production, the usual methods of evaluating and selecting 'off the shelf' products cannot be wholly applied (Mohsini and Davidson, 1992). Nevertheless some of the factors identified as being relevant from both construction and marketing literatures had already been discussed in the preceding chapter, and were confirmed through a pilot survey of 5 construction clients, tested for suitability and comprehensibility.

Given the nature of such influences and frequent changes in project procurement practices in the construction industry (Nobbs, 1993), new working relationships between clients' firms and construction companies are inevitable. Indeed to be competitive clients' firms must certainly have to satisfy the needs of their own customers with the right products and services and in the process a plethora of factors invariably impact on decisions including the decision to build. Before discussing in detail the factors influencing client decision to build let us first examine the characteristics of the client organisations surveyed.

5.3 Characteristics of clients surveyed

The types of client organisations surveyed are shown on Table 5.1, with developers considered a separate grouping because of their distinct operational characteristics and prominence in the construction industry. Table 5.2 shows the size (i.e number of staff) of clients organisations. More than one half (55%) of all client organisations surveyed have 51 plus staff member. The bulk of the work was commissioned by those employing more than 50 staff representing approximately 65% of all the projects commissioned by all clients in the last five years (Table 5.3). This is made up of public clients and some big private corporations and developers. Clients' organisations with staff members in the range of 11-30 accounted for approximately 19% of all projects. Client organisations with 10 staff members or less accounted for only 5% of all the projects commissioned.

Table 5.1 Type of clients surveyed

Client type	Percentage respondents	Number
Developer client	30.0	12
Private client	27.5	11
Public client	42.5	17
	100	40

Table 5.2 Size of clients surveyed

Size of clients (number of staff)	Percentage of clients
1 - 5	15.0
6 - 10	5.0
11 - 30	17.5
31 - 50	7.5
51+	55.0

Table 5.3 Size of organisation with proportion of projects commissioned

Size of organisation (number of staff)	Number of projects	Percentage (%) of projects
1 - 5	94	4.3
6 - 10	15	0.7
11 - 30	410	18.6
31 - 50	250	11.3
51+	1440	65.1
Total	2209	100.0

The respondents to the survey have completed between them 2209 projects within the last five years equating to an average of 442 projects every year over the last five years (Table 5.3).

It can been seen that public sector clients (central government, local authority etc.) commissioned a higher proportion of all projects (44.8%) than developer (27.8%) or private (27.4%) clients (Table 5.4). The combined commissions of both developer and private clients of approximately 55% is very significant. The number of staff per client organisation varied from a minimum of 2 to a maximum of 2000. This gives a mean staff number of 248 per client.

Clients' organisations who took part in this survey have been involved with the construction industry in one way or the other for years ranging from a minimum of 4 to a maximum of 500 years - a mean of approximately 50 years. In fact, about 63% of all client organisations have been involved in the construction industry between 10 to 50 years (Table 5.5). This confirmed the earlier statement that respondents have varying degrees of experience with the construction industry.

Turnover ranged from a minimum of £0.2 million to a maximum of £300 million per annum. This gives a mean turnover of approximately £50.5 million. Using turnover as a measure of the size of the organisations, this indicates that the average size of the respondents to this survey is quite substantial. The average job size the participating top client organisations commissioned, expressed in Pounds Sterling, is shown in Table 5.6. About 55.2% and 37.9% of top client organisations commission work with an average size between £50000 and £500000 and between £500000 and £10 million respectively. Table 5.7 shows the mean value of turnover, number of projects commissioned and years of experience of disaggregated client category.

Table 5.4 Proportion of projects commissioned by clients

Client type	Number of respondents	Percentage respondents
Developer	615	27.8
Private	605	27.4
Public	989	44.8
Total	2209	100.0

Table 5.5 Number of years in the construction business

Years in business	Percentage of respondents
Under 10 years	7.4
10 years - under 20 years	29.6
20 years - under 30 years	22.3
30 years - under 40 years	3.7
40 years - under 50 years	7.4
Over 50 years	29.6

Table 5.6 Average job size of clients

Contract size	Percentage respondents
Under £50000	3.4
£50000 - under £500000	55.2
£500000 - under £1 million	17.2
£1 million - under £10 million	20.7
£10 million - under £15 million	3.4
Over £15 million	0.0

Table 5.7 Mean value of turnover, number of projects commissioned and years of experience of respondents

Client type	Mean turnover (£m)	Mean no. of projects commissioned in last 5 years	Mean years of experience
Developer	71.7	51	26.2
Private	51.8	55	29.2
Public	22.2	58	84.2

52.5% of the respondents to the study described the structure of their organisation as complex with respect to authority and decision making, with a typical structure as shown in Figure 5. 1. 62.5% had centralised communication channels. Interestingly, communication channels and structure of client organisations seemingly did not affect how the factors were rated. Nevertheless the provision of relevant information and how it is communicated is reported in the literature as crucial for the success of a project (Rowings et. al., 1987; Cherrington, 1989).

Before proceeding with statistical evaluation of factors influencing clients' decision to build described in the next section, it is a appropriate to test the factors scores provided by respondents for normality. Results indicate that most of the numerical scores provided by respondents are normally distributed at a significant level of at least 90% (Table 5.8a).

Table 5.8a Normality test of factors influencing clients' decision to build

Factors	Statistics	Significance
Need for more facility	0.30	0.040
Profit / Economic reasons	0.30	0.033
Location	0.20	0.103
Users preference	0.20	0.100
Social expectation	0.02	0.092
Change of attitude	0.20	0.104
Status / prestige	0.20	0.084
Director's preference	0.02	0.088
Corporate ego	0.20	0.111
Cultural influence	0.30	0.054
Workers' pressure	0.40	0.012

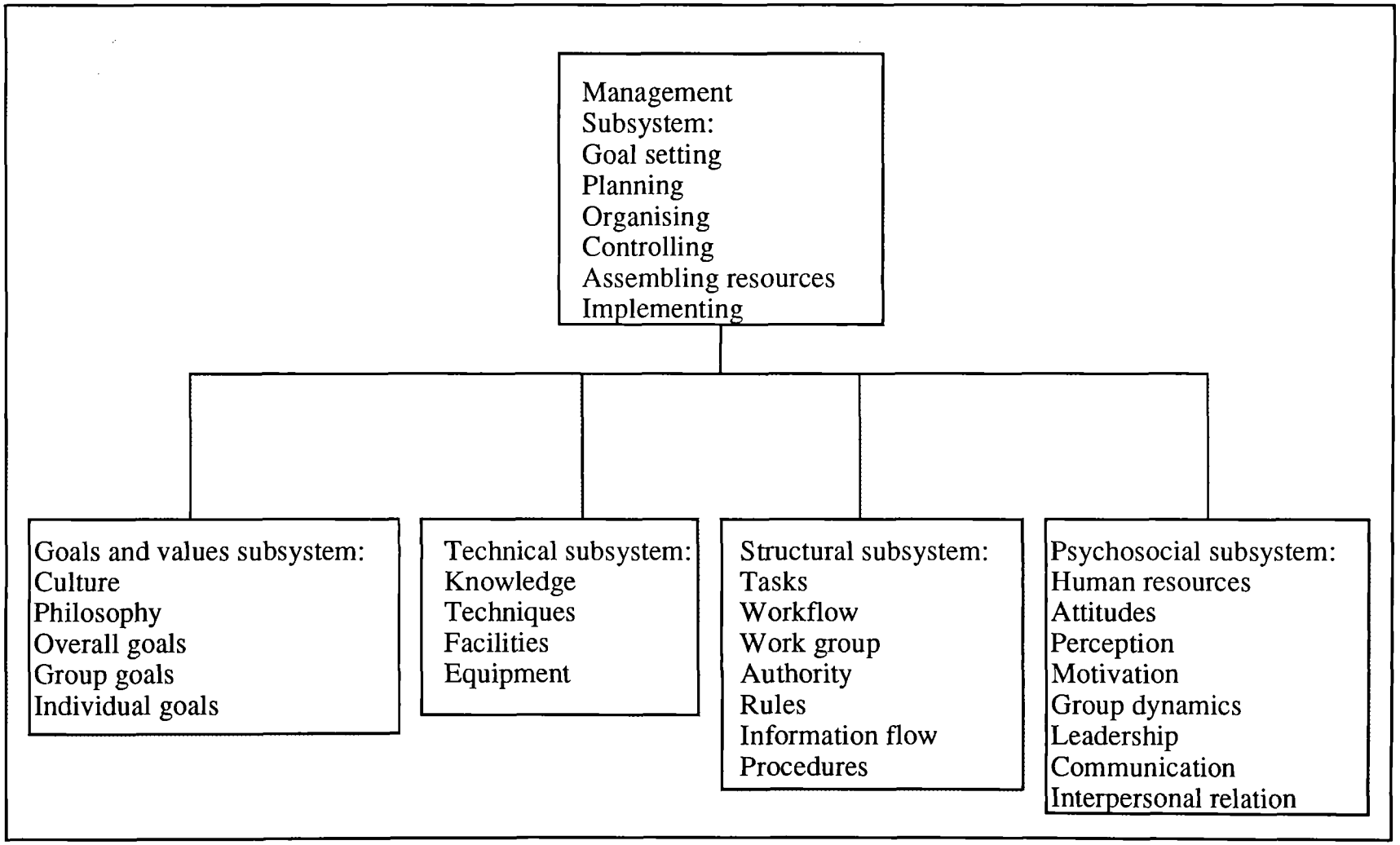

Figure 5.1 Typical Organisational Structure of Surveyed firms after Kast and Rosenzweig, 1988

5.4 The relative importance of factors influencing the construction client to build

A three-stage data analysis approach was adopted. The first step was simply to determine the relative importance of the factors using the well established relative importance index route. Secondly, the linear relationships between the factors were established by correlation analysis. These two basic analysis enabled a discussion of the relative importance and relationships between the factors. The third step was to determine the interaction between groups of factors by Principal Component Factor Analysis (PCFA) technique which enabled a more indepth understanding of the factor groupings underpinning the decision to build.

Numerical scores from the questionnaire provided a measure of the strength of opinion of the effect of each factor on clients original decisions to embark on a building project. These were subsequently transformed into relative importance indices using the well established relative index ranking technique (Olomolaiye et. al., 1987; Shash, 1993) calculated using the following formula:

$$\text{Relative Importance Index} = \frac{\Sigma w}{A * N}$$

where: w = weighting given to each factor by the respondents and ranges from 1 to 7 where '1' is the least important and '7' the most important;
A = highest weight (i.e 7 in our case);
N = total number of sample.

The relative importance index ranges from 0 to 1. As would be expected, whilst some factors have high leverage on clients' decision to build others do not. For example, *need for more facility, profit / economic reasons, user preference, location,* and *change of attitude* are significant with each scoring 0.50 or more. The least important were identified as: *cultural influence* and *workers' pressure* . Table 5.8b provides a full list of the overall relative indices and ranking of the factors, while Tables 5.9, 5.10, and 5.11 show the disaggregated relative indices and ranking of the factors by developer, private and public clients respectively. Let us now consider each of the factor in turn.

Table 5.8b Factors affecting all clients' decision to build with their rank

Factors	Percentage of respondents scoring			Relative Importance Index	Rank
	≤3	4	≥5		
Need for more facility	10.8	5.4	83.4	0.83	1st
Profit / Economic reasons	24.3	8.1	67.6	0.76	2nd
Location	27.0	13.5	59.5	0.68	3rd
Users preference	29.7	16.2	54.1	0.64	4th
Social expectation	56.8	16.2	27.0	0.44	5th
Change of attitude	59.5	16.2	24.3	0.42	6th
Status / prestige	56.8	37.8	5.4	0.40	7th
Director's preference	67.6	18.9	13.5	0.39	8th
Corporate ego	70.3	21.6	8.1	0.38	9th
Cultural influence	70.3	21.6	8.1	0.34	10th
Workers' pressure	81.1	16.2	2.7	0.27	11th

5.4.1 Need for more facility

Taking the relative indices as an aggregate measure of importance, 'need for more facility' ranks the most important influence on client's decision to build with an overall index of 0.83 (See Table 5.8b). The need for more facility gradually builds up within a client system as recognised by Rowings et. al. (1987) and is manifested when the client finally commits itself to a project, the shear inadequacy of the client's present facility may generate this need, possibly from increased business activity. 83.4% of the clients surveyed rated this factor with a score of 5 or more (Table 5.8b), with developers, private and public clients ranking it fourth, first, and first respectively (Tables 5.9, 5.10, & 5.11). The developers' lower ranking relative to both private and public clients may be related to a lower need for facilities. Private and public sectors ranking values of 0.96 and 0.86 respectively are very high indeed (Tables 5.9 & 5.10) implying that this factor underpins their decision to build. *Need for more facility* has it's highest, though not significant, correlation coefficient of -0.28 with *profit /economic reason.* In the immediate short term a company/client may have to plough back some of its profit for a new facility which may explain the negative correlation coefficient between these two factors. However, in the long term it would be expected that a new facility would enhance

the profitability and image of an organisation. We should not read too much into this relationship as it was found not to be significant. Users of an organisation's facilities will always demand better quality as demonstrated by the positive, though not significant, correlation coefficient of 0.27 between *Users preference* and *Need for more facility*.

5.4.2 Profit/Economic reason

Ranked second with a relative index of 0.76 (Table 5.8b). 68% of the respondents scored it 5 or more. When disaggregated according to client types it was ranked first, second and fourth by developers, private and public clients respectively. Obviously developers are in business for profit hence the high ranking, public clients are often not profit motivated. *Profit / economic reason* relates significantly with *location* with a correlation coefficient of 0.39 (see Table 5.12). Clients locate their project strategically to derive economic benefits.

5.4.3 Location

With an overall relative ranking index of 0.68, *location* ranked third with 60% scoring it 5 or more on the importance scale. The location of a project influences the availability of labour and material directly impacting on cost. It was ranked second, third, and fifth by developers, private and public clients respectively. In the case of developers more control can be exerted on nearby project and costs may be lower through reduced overhead expenses and better knowledge of material, suppliers, etc. Similar reasons apply for private clients whereas public clients generally do not have as much interest in project location compared to other categories probably because their location is already determined. *Location* correlates with *corporate ego, director's preference*, and *status / prestige* with significant correlation coefficients of 0.48, 0.57, and 0.38 respectively (Table 5.12). The correlation between *director's preference* and *location* is reasonable as directors prefer their project to be carefully located to generate a competitive edge.

Table 5.9 Factors affecting developers' decision to build

Factors	Relative Importance Index	Rank
Profit/Economic reason	0.92	1st
Location	0.81	2nd
Users preference	0.70	3rd
Need for more facility	0.68	4th
Director's preference	0.53	5th
Change of attitude	0.51	6th
Status/prestige	0.49	7th
Corporate ego	0.45	8th
Cultural influence	0.39	9th
Social expectation	0.39*	10th
Workers' pressure	0.35	11th

*Equal relative importance indices; ranked in accordance with the percentage of respondents scoring 5 or more (See Table 5.8b)

Table 5.10 Factors affecting private clients' decision to build

Factors	Relative Importance Index	Rank
Need for more facility	0.96	1st
Profit/Economic reason	0.90	2nd
Location	0.80	3rd
Users preference	0.57	4th
Director's preference	0.41	5th
Status/prestige	0.40	6th
Corporate ego	0.39	7th
Social expectation	0.36	8th
Change of attitude	0.23	9th
Cultural influence	0.21	10th
Worker's pressure	0.19	11th

Table 5.11 Factors affecting public clients' decision to build

Factors	Relative Importance Index	Rank
Need for more facility	0.86	1st
Users preference	0.65	2nd
Social expectation	0.60	3rd
Profit/Economic reason	0.55	4th
Location	0.52	5th
Change of attitude	0.48	6th
Cultural influence	0.38	7th
Status/prestige	0.34	8th
Corporate ego	0.32	9th
Director's preference	0.27	10th
Worker's pressure	0.26	11th

5.4.4 User preference

Ranked fourth with an overall relative index of 0.64. Eventually, a building must be occupied by its users, as such the influence of end users in the building process is one of the main project procurement determinants. 54.1% of the clients surveyed rated 'users preference' with a score of 5 or more. Developers, private and public clients ranked this factor as third, fourth, and second respectively. The rank given by developers is not surprising given the need to produce buildings that suit tenants otherwise letting would be difficult. Public clients must be responsive to public needs to provide suitable facilities, with one of their important responsibilities being seen to spend money judiciously. *User preference* correlates with *director's preference* albeit with an insignificant coefficient of 0.36. *Users' preference* could reasonably be expected to influence directors perception of the quality required to let the property profitably.

5.4.5 Social expectation

Ranked fifth with an overall relative index of 0.44, and ranked tenth, eighth, and third by the developer, private, and public sectors clients respectively. The wide differences in rank is not obvious, perhaps developers are not interested in social issues; wanting only to sell the product and make profit as soon as possible. Developers consider this factor only to the extent that

customers will take note of it (Stone, 1980). The third rank given by public clients could be expected because of the need for accountability and social issues. *Social expectation* correlates with *change of attitude* with an insignificant coefficient of 0.35 implying social issues may trigger *change of attitude* within and without the client's organisation.

5.4.6 Change of attitude

Ranked sixth with an overall relative index of 0.42. Only 24.3% of the clients surveyed rated this factor with a score of 5 or more, surprisingly low compared to its relative index even though there is no mathematical relationship between these two measurements. It should be noted that the percentage of respondents scoring 5 or more is just another way of expressing the importance of the factors. In this case, the low value may be due to the fact that most respondents rated it with a score of 4 or less. This factor was ranked sixth, ninth, and sixth by developers, private and public clients respectively. Obviously, it is of some importance to the developer and the public client, in having to adapt and reflect changes in public attitudes. *Change of attitude* has a significant correlation (coefficient of 0.58) with *cultural influence* showing that culture within / without an organisation may determine attitude to some degree. *Change of attitude* also correlates significantly with *workers' pressure* with a coefficient of 0.51. Perhaps *workers' pressure* encourage management's attitude to acquiring worker friendly environments.

5.4.7 Other factors

Status/prestige (0.40), director's preference (0.39), corporate ego (0.38), cultural influence (0.34), and workers' pressure (0.27) ranked seventh, eighth, ninth, tenth, and eleventh respectively. The ranking of *status/prestige*, and *corporate ego* as seventh and ninth with an overall relative indices of 0.40 and 0.38 respectively is a little surprising (Table 5.8b), since Macdonald (1989) rated prestigious buildings as powerful influences on *corporate ego / status*, and would therefore have been expected in the top half of the list. They both correlate strongly with a significant coefficient of 0.79 (Table 5.12). The relationship is quite obvious as *corporate ego,* and *status / prestige* always go hand in hand. *Status / prestige* also relate strongly with *director's preference* with a coefficient of 0.58 indicating that organisational prestige influences directors eventual choice of what and where to build.

Of all the factors studied *workers' pressure* , with an overall index of 0.27 had the lowest rank (Tables 5.9, 5.10 & 5.11), with the implication that this factor has very little influence on clients' decision to build. Perhaps general employees have little input into corporate decision making in the surveyed firms. It however bears significantly on other factors e.g *change of attitude* as previously mentioned.

5.5 Factor groupings using principal component factor analysis

To understand how the factors work together in influencing clients' decision to build and to further explore the structure of the data, the Principal Component Factor Analysis (PCFA) technique was employed. To ensure the suitability of the data for this analysis, certain statistical test had to be performed. The determinant of the correlation matrix shown on Table 5.12 is 0.0066 which is greater than the required 0.00001 indicating that the data matrix does not suffer from multicollinearity or singularity (Kinear and Gray, 1993). The Kaiser - Meyer - Olkin measure of sampling adequacy was found to be 0.627 which is greater than 0.5 confirming that the sampling adequacy is acceptable. As mentioned in chapter 4, the PCFA was conducted on a personal computer using the Statistical Package for the Social Sciences (SPSS) suite of programmes.

Table 5.13 shows all the factors with their eigenvalues, percentage of variance and cumulative percentage of variance. Three factors (Factors 1, 2 and 3) were extracted from the analysis based on their eigenvalue being greater than 1 (Table 5.14a).

Table 5.12 Correlation matrix showing relationship between client decision factors

	Profit / Economic reason	Corporate ego	Workers' pressure	Social expectation	Director's preference	Users' preference	Status/ Prestige	Location	Need for more facilities	Change of attitude	Cultural influence
Profit / Economic reasons	1.00										
Corporate ego	0.23	1.00									
Workers' pressure	0.05	0.46*	1.00								
Social expectation	-0.35	-0.12	0.28	1.00							
Director's preference	0.36	0.71**	0.43*	-0.10	1.00						
Users' preference	-0.10	0.19	0.18	0.25	0.36	1.00					
Status /Prestige	0.28	0.79**	0.48*	0.02	0.58**	0.17	1.00				
Location	0.39*	0.48*	0.30	-0.11	0.57**	0.20	0.38*	1.00			
Need for more facilities	-0.28	-0.02	-0.04	0.08	-0.14	0.27	0.03	0.16	1.00		
Change of attitude	-0.14	0.24	0.51**	0.35	0.31	0.17	0.25	0.03	-0.09	1.00	
Cultural influence	0.02	0.21	0.41*	0.43	0.07	0.20	0.31	-0.04	0.10	0.58**	1.00

* 1% Significance ** 0.1% Significance

Table 5.14a also shows the factor-loadings of all the variables on the three factors except for loadings with coefficient less than 0.05. The table contains the communalities which show how much of the variance in the variables have been accounted for by the three factors that have been extracted: for example, about 75% of the variance in *corporate ego* is accounted for, whereas only 55% of the variance in *users' preference* is accounted for. A close examination of the communalities revealed that the three factors in the analysis account for over 60% of the variance in all the variables except for two variables *(users' preference* and *profit/economic reason*) suggesting that the factor analysis has been quite effective. Table 5.14a shows the associated percentage of variance of the three factors; 33.0%, 20.2%, and 12.4% for *factors 1, 2,* and *3* respectively. Like the percentage of variance in the table, the eigenvalues indicates the relative importance of the various factors in accounting for the total variance in the data set. Note that factors with eigenvalues of less than 1 are not selected because an eigenvalue is a measure of standardised variance with a mean of 0 and standard deviation of 1; and the variance that each standard variable contributes to the principal components extraction is 1; a component with an eigenvalue of less than 1 is less important than an observed variable and can therefore be ignored.

Table 5.13 Initial statistics of Principal Component Factor Analysis - client decision factors

Factors	Eigenvalues	Percentage of variance	Cumulative % of variance
1	3.627	33.0	33.0
2	2.226	20.2	53.2
3	1.361	12.4	65.6
4	0.824	7.5	72.1
5	0.761	6.9	80.0
6	0.649	5.9	85.9
7	0.567	5.2	91.0
8	0.406	3.7	94.7
9	0.255	2.3	97.1
10	0.197	1.8	98.8
11	0.128	1.2	100.0

In order to achieve factor-loadings which are easier to interpret than those shown on Table 5.14a, a varimax rotation was carried out on the factors. This had the effect of minimising the number of factors on which the variables have high loadings. The new factor-loadings are shown on Table 5.14b which is more easier to interpret psychologically. Factor-loading is simply the correlation coefficient between an original variable and an extracted factor. Thus the higher the absolute value of the loading the more the variable contributes to the factor. After the rotation it was evident that *Director's preference*, *corporate ego*, *status/prestige*, *location* and *profit/economic reasons* are loaded substantially only on *factor 1* in that order, *change of attitude*, *cultural influence*, *social expectation* and *workers' pressure* are loaded only on *factor 2* and *need for more facilities* and *users' preference* are loaded only on *factor 3*. Moreover, a scatter plot of the factors (Figs. 5.2 and 5.3) show that the data lies close to two dimensional subspace and would therefore represent the whole data and thereby reduce any concentration on other none principal factors of the data.

For clarity let us term these factor groupings simply as Groups. Clearly, Group 1 can be regarded as containing issues pertaining to the organisation. **Organisational factors** seem to predominate the clients decision to build. Group 2 seem to involve **structural issues** while Group 3 involve **externalities**. Labelling groups of factors in this manner is however, subjective and may be challenged by others as being inappropriate. Taking the eigenvalue as a measure of importance it is evident that Group 1 with the highest eigenvalue of 3.627 is the most important group of factors influencing clients' decision to build. This is followed by Groups 2 and 3 with eigenvalues of 2.226 and 1.361 respectively.

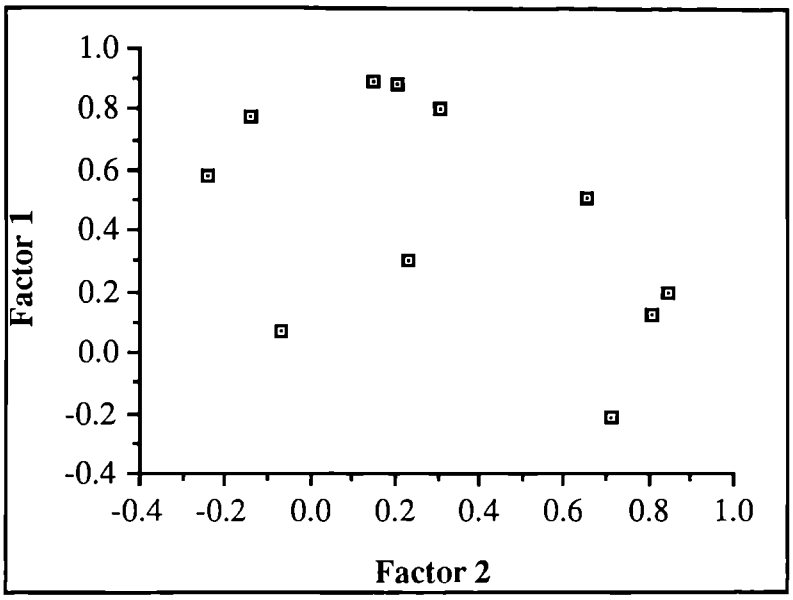

Figure 5.2 Factor 1 Vs. Factor 2 Client decision variables

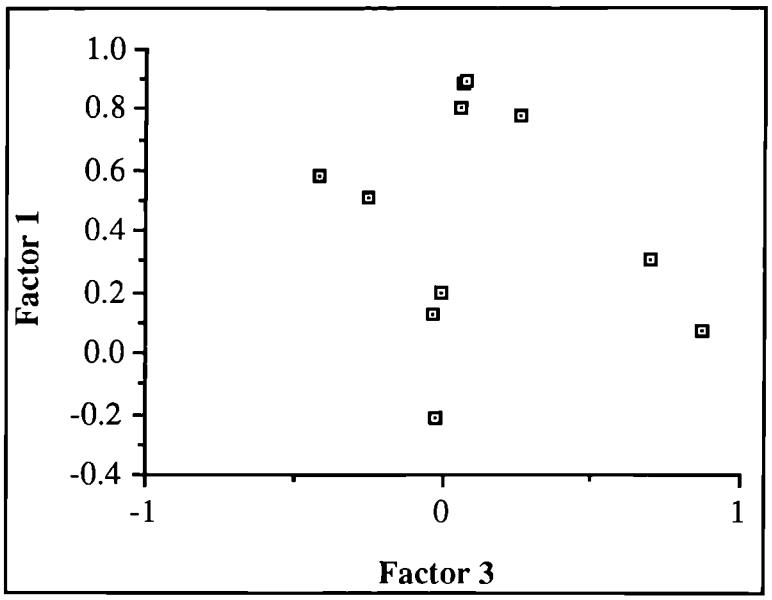

Figure 5.3 Factor 1 Vs. Factor 3 Client decision variables

Table 5.14a **Factor-Loadings before varimax rotation - client decision factors**

Variables	Factors			Achieved communalities
	Factor 1	Factor 2	Factor 3	
Corporate ego	0.833	-0.239		0.752
Director's preference	0.816	-0.297		0.757
Status/prestige	0.810	-0.122		0.672
Workers' pressure	0.714	0.286	-0.175	0.622
Location	0.598	-0.399	0.340	0.633
Social expectation	0.126	0.775		0.616
Profit/economic reasons	0.319	-0.628	-0.272	0.570
Cultural influence	0.453	0.614	0.212	0.627
Change of attitude	0.520	0.567	-0.329	0.699
Need for more facilities		0.237	0.811	0.714
Users' preference	0.386	0.276	0.572	0.552
Eigenvalues:	3.627	2.226	1.361	
Percentage of variance:	33.0	20.2	12.4	
Cumulative % of variance:	33.0	53.2	65.6	

Table 5.14b **Factor-Loadings after varimax rotation - client decision factors**

Variables	Factors			Achieved communalities
	Factor 1	Factor 2	Factor 3	
Director's preference	0.861	0.125		0.757
Corporate ego	0.847	0.182		0.752
Status/prestige	0.769	0.282		0.672
Location	0.745	-0.163	0.225	0.633
Profit/economic reasons	0.545	-0.267	-0.448	0.570
Change of attitude	0.162	0.818		0.699
Cultural influence	0.093	0.785	-0.065	0.627
Social expectation	-0.249	0.687	-0.055	0.616
Workers' pressure	0.478	0.627	-0.286	0.622
Need for more facilities		-0.092	0.839	0.714
Users' preference	0.268	0.206	0.661	0.552
Eigenvalues:	3.627	2.226	1.361	
Percentage of variance:	33.0	20.2	12.4	
Cumulative % of variance:	33.0	53.2	65.6	

5.6 Summary

Earlier works on construction clients concentrated on how best to communicate their needs and requirements to consultants once the decision to build had been taken. Researchers have failed to appreciate that long before the decision to build is taken, several forces act and will continue to act within the client organisation to influence the decision to build. Whilst there is no construction specific theory to explain the decision to build the capital accumulation theories postulated in sociology, economics, and marketing are likely to be relevant, particularly those aspects of interest in market research i.e variables influencing individuals and organisational buying behaviour. In this respect the Webster and Yoram's industrial / institutional buying decision model (1972) which stated that buying decisions take place in the context of formal organisation influenced by budget, cost and profit considerations and usually involves many

people in the decision process, could to some extent explain the decision to build process. The fundamental assertion in Webster and Yoram's model is that organisational buying is a decision making process carried out by individuals, in interaction with other people, and in the context of formal organisation influenced by a variety of forces within it's environment. Similarly, client decision to build can be explained in the same line. Indeed in this chapter, the socio-dynamic and psychological forces that influence the decision to build have been highlighted and strong relationship between them demonstrated, typically between *status / prestige* and *corporate ego*; *change of attitude* and *workers' pressure*; and *location* and *director's preference* which in turn relate to other factors to form a complex web of client motivating factors. PCFA was finally employed to determine the structure of the data and three factor groupings were extracted. Results from this chapter would seem to support the hypothesis that there are many variables influencing decisions in clients' organisations including the decision to build. The PCFA essentially combined the factors into 3 groups as follows:

1. director's preference, corporate ego, status/prestige, location and profit/economic reasons. Status/prestige and corporate ego have an unusually high correlation coefficients which imply that some respondents could have understood them as meaning the same thing. Note that they were eventually placed in the same group after the factor analysis.
2. change of attitude, cultural influence, social expectation and workers' pressure; and
3. users' preference and need for more facilities - this two appear quite independent of the other variables.

If the consultant in general and the client in particular could appreciate the complexities that instigated the project, they will both perform their respective roles more adequately and ensure a successful project outcome.

CHAPTER 6

CHAPTER 6
CLIENTS' NEEDS AND RESPONSIBILITIES IN THE CONSTRUCTION PROCESS

6.1 Introduction

It was concluded in the preceding chapter that socio-dynamic forces acting within a client organisation eventually influence the decision to build, and that if the client organisation and the consulting firm understand these forces, they will both perform their respective roles more adequately and ensure a successful project outcome. Understanding these forces leads to greater understanding of the clients' needs. In this chapter we shall look at results of investigating client fundamental needs identified in chapter 2; their relative importance to client will be statistically evaluated and discussed. In this chapter, we shall also test the hypothesis, stated in chapter 4, that client responsibilities as perceived by client themselves and consulting firms are similar.

The realisation of most construction projects involves the bringing together of many separate parties including clients, consultants, contractors, suppliers, and sub-contractors (Cherns and Bryant, 1984; Bryant et al, 1969). The client has a tremendous responsibility to ensure that his project is successfully realised but unfortunately, this is not usually the case. Much has been written regarding client responsibility in construction projects (CIOB, 1980; CIRIA, 1987; NEDO, 1974). The degree of responsibility that clients exercise over their projects depends primarily on their experience (Bennett and Flanagan, 1983; Nahapiet and Nahapiet, 1985; Rowlinson and Newcombe, 1984). An experienced client as defined by Masterman (1992) and Walker (1984) is one that builds on a regular or continuous basis i.e more than once every five years while inexperienced clients build only once or less every five years.

All construction clients whether experienced or not, should be involved in the building process in order to get what they want (Ministry of Public Building and Works, 1965; Wood Report, 1975; NEDO, 1976a,b, 1983, 1985; CIOB, 1982; CIRIA, 1987). As mentioned in chapter 2, Bennett (1985), covered a wide scope of client involvement in construction projects under five main headings.

These responsibilities are far reaching. Obviously, inexperienced clients would not be able to take on these responsibilities due to their lack of knowledge of the construction industry (Higgin and Jessop, 1965; NEDO, 1983). This implies that the construction industry should encourage their clients to be more active in the construction process - by passing on more responsibilities to them. Where this is not the case then the client should make the effort to become more active and involved in the process. The benefits stemming from active involvement have been recognised (Bennett, 1985; NEDO, 1983), after all the client needs the building and more importantly, the client is the one with a full knowledge of the internal workings and personalities within his organisation.

6.2 The fundamental needs of the construction clients

This was measured using a seven point Likert scale with response alternative ranging from 1, not important, to 7, very important; normality test was conducted on the scores provided by respondents on each need. Results indicate that all needs were normally distributed at 90% significance level. Responses were transformed to relative importance indices using the relative index ranking technique as demonstrated in chapter 5 to determine the ranks of the fundamental needs. Effectively, each mean was divided by the upper scale of the measurement resulting in what is referred to as the relative importance index making inferences of the probable relative influences of the needs possible. As the name suggests, this is not an absolute measure but a quantifying technique based on the strength of a respondent's opinion of the importance of a particular need. Relationships between the needs on scale of 0 to 1 can readily be seen (Olomolaiye et. al., 1987; Shash, 1993).

Examining the indices (Table 6.1), it can be seen that some needs are more important than others. For example, *functionality*, *safety*, and *quality* of the building are more important to clients. This contradicts the famous trio of time, cost, and quality as clients main needs (Hewitt, 1985; University of Reading, 1988). The result indicates that clients place *functionality* of the building as most important. This is in agreement with an earlier study by NEDO (1988). *Functionality*, *safety*, and *quality* scored more than 0.80 on the relative index scale. Tables 6.2a, b, and c show the ranking of the fundamental needs by developer, private

and public clients respectively.

Table 6.1 Relative importance of the fundamental needs of all clients

Needs	% of respondents scoring			Relative Index	Ranks
	≤3	4	≥5		
Function	0.0	2.5	97.5	0.95	1st
Safety	2.5	5.0	92.5	0.90	2nd
Quality	0.0	12.5	87.5	0.84	3rd
Time	5.0	15.0	80.0	0.81	4th
Economy (cost)	7.5	12.5	80.0	0.79	5th
Running/Maintenance cost	10.0	17.5	72.5	0.76	6th
Flexible to uses	32.5	17.5	50.0	0.59	7th

6.2.1 Function

Taking the relative indices as a measure of the importance of the fundamental needs of clients, *functionality* of the building ranked most important with an overall index of 0.95 (Table 6.1). The importance of this had earlier been recognised by NEDO (1988). The ranking of this should not at all be surprising because there would not be any point to undertake a project if at the end of the day the project does not fulfil its intended function. Developers, private and public clients all ranked this first (Tables 6.2a, b &c). This is more important to private clients than developers and public clients as depicted by their relative importance indices of 1.0, 0.95 and 0.92 respectively.

6.2.2 Safety

This relates to safety during construction and throughout the life time of the building. Ideally the two types of safety should have been distinguished in the survey to determine the relative importance of each, however, safety in general ranked second with a relative index of 0.90. More and more clients are taking *safety* seriously probably because of the emphasis placed by the Health and Safety Executive (Health and Safety at Work Act 1974). Stringent rules on this aspect became law in 1994. The importance of safety is also reflected in the insurance policy that both clients and the construction team have to take out. Safety on construction sites has

been widely covered by Niskanen and Lauttalammi (1989a, b). Developers ranked this third and private and public clients both ranked it second. The superior ranking by private and public clients is probably because of the need to consider safety of individuals and the public at large.

Table 6.2a Relative importance of fundamental needs of developers

Needs	Relative Index	Ranks
Function	0.95	1st
Quality	0.88	2nd
Safety	0.83	3rd
Economy (cost)	0.77	4th
Running/Maintenance cost	0.75	5th
Time	0.73	6th
Flexible to uses	0.57	7th

Table 6.2b Relative importance of fundamental needs of private clients

Needs	Relative Index	Ranks
Function	1.00	1st
Safety	0.92	2nd
Time	0.92*	3rd
Quality	0.86	4th
Economy (cost)	0.81	5th
Running / Maintenance cost	0.75	6th
Flexible to uses	0.65	7th

* Equal relative importance indices; ranked in accordance with percentage of respondents scoring 5 or more (see Table 6.1).

Table 6.2c Relative importance of fundamental needs of public clients

Needs	Relative Index	Ranks
Function	0.92	1st
Safety	0.92*	2nd
Quality	0.80	3rd
Time	0.79	4th
Economy (cost)	0.78	5th
Running / Maintenance cost	0.78*	6th
Flexible to uses	0.57	7th

* Equal relative importance indices; ranked in accordance with percentage of respondents scoring 5 or more (see Table 6.1).

6.2.3 Quality

With an index of 0.84, *quality* ranked third overall. This is probably because after securing the *functionality* and *safety* of their building, the next thing that clients most desire in their building is for it to have at least a minimum standard of quality. Because of its subjectivity, *quality* lies in the eye (and the pocket) of the beholder (Seymour and Low, 1990). The developer, private and public clients ranked this need second, fourth, and third respectively. The ranking by developers is obvious as they have to produce high quality buildings in order to let them and, because their business is very competitive. Public clients ranked this third because they have a duty to convince the public that they are capable of providing good services - as part of their obligation to be accountable. Private clients may have been influenced by financial constraints; they may prefer high quality building but this is costly. Indeed Bresnen et al. (1990) found that the private sector placed greater emphasis on cost than quality.

6.2.4 Time

Respondents ranked timely completion fourth with a relative index of 0.81. Some clients get involved with construction projects only with the express agreement that certain deadlines will be met. The importance of timing had previously been recognised (CIOB, 1980; NEDO, 1983). However, not all clients are interested in *time* (Banwell, 1964; NEDO, 1983). These

studies found that few customers were interested in speed or had explicitly considered the influence of *time* on the costs and returns from the project. Hence, the fourth ranking given to time in this survey is much in line with general thinking. Developers, private and public clients ranked time sixth, third, and fourth respectively. The lower ranking by developers is surprising as most of their projects are speculative and therefore timing should be crucial.

6.2.5 Economy (cost)

This was ranked fifth with an overall relative index of 0.79. Economy in this context refers to the cost of the project from inception to completion i.e., the building should be produced economically. This ranking conflicts with previous studies which tend to rank *cost* amongst the three most important needs of construction clients (Hewitt, 1985; NEDO, 1988; Baker and Orsaah, 1985; Harris and Pettet, 1978; Lucas, 1974). While not disputing the fact that cost is important, the building should first be *functional*, be *safe*, and achieve a minimum standard of *quality* within the budget. Developers ranked this need fourth while private and public clients both ranked it fifth. The superior ranking by developers could be explained by the profit motives of developers who may want maximum return from their limited investment. The poor ranking by public clients is a bit surprising because they are expected to spend money wisely - public accountability. Obviously public clients do not embark on a spending spree, the factors discussed earlier are simply intrinsically more important than *cost* to public clients.

6.2.6 Running / maintenance cost

With an index of 0.76, *Running / maintenance cost* ranked sixth. Most often, attention is only paid to maintenance after the building has become operational. Developers ranked this need fifth while private and public clients both ranked it sixth. The higher ranking by developers could be explained by the fact that most do not sell, especially in this depressed market, but let their properties and therefore *running / maintenance costs* are more important to them compared to both private and public sector clients. The importance of this should not be underestimated by its lower ranking - such costs can be very substantial during the life time of a building.

6.2.7 Flexible to uses

Achieved lowest rank with an index of 0.59. All categories of clients ranked this the least important. The low ranking of this need is very surprising indeed as it was thought that clients especially developers would be interested in developing buildings for different uses. The ranking seems to suggest that clients more often than not have a particular use for building before embarking on any project.

6.3 The responsibilities of construction clients

As mentioned earlier, clients have to accept certain responsibilities in the construction process in order to meet the fundamental needs of their buildings. The fundamental needs mentioned earlier were ranked as shown in Table 6.1. Obviously, to realise these, clients must accept some responsibilities in the construction process. These responsibilities has been discussed and defined in chapter 4; based on the success factors identified by Morris and Hough (1986). Clients were asked to rank the responsibilities according to how they perceived it will help them to satisfy their fundamental needs identified in the previous section. The same set of success factors as clients' responsibilities were presented to project consultants for assessment. The purpose here was to test if there was any agreement or otherwise on clients' responsibilities as perceived by both clients and consultants. Respondents provided their responses on a seven point scale which were found to be normally distributed. Again the relative index ranking technique was used to evaluate these responsibilities. Respective ranking of these responsibilities are given for clients and consultants in Tables 6.3 and 6.4. Let us now discuss some of these responsibilities.

6.3.1 In house planning and design

Taking the relative indices as a measure of the importance of clients' responsibility in the construction process, *planning / design* ranked the most important with an overall index of 0.85 (Table 6.3). This refers to the in-house planning and design that some clients undertake before approaching a consultant or a contractor. It should be noted that not all clients undertake in-house design. This is particularly true in the case of 'inexperienced' or new construction clients. However, all clients are expected to plan their project, i.e to offer input on how their needs may be met. The ranking of this responsibility may be because decisions taken at the

planning stage will later influence the success or failure of the project. As a client's responsibility, project consultants ranked this third with an overall index of 0.81 (Table 6.4). Obviously, this is important to project consultants, they expect clients to at least give thought to how they plan to realise their needs before any professional consultation. This will facilitate mutual understanding of clients' needs.

6.3.2 Project finance

It should be appreciated that the client's responsibility in financing the project was measured using two sub-attributes (page 222). The average from these was taken to represent the score for 'project finance'. With an overall relative index of 0.84, clients ranked *project finance* second. The client should obviously be responsible for the funding of the project. As well as securing a stable source of funding, full financial analysis of all project risks from the client's point of view should be undertaken. The sponsors should be interested in the success of the project per se. As a client's responsibility, project consultants ranked *project finance* first. This is understandable in that consultants are expected to ensure that the client is financially stable to see the project through. The importance of financial stability has long been understood (Russell and Skibniewski, 1988) and highlighted recently by Holt et. al. (1994).

6.3.3 Project implementation / management

Of the responsibilities identified, clients ranked this third with an overall relative index of 0.83. The ranking would seem to indicate that it is necessary for clients to select appropriate consultants and contractors, foster good client - contractor relations, hence making sure that the project will be well implemented and managed by the experienced teams selected by them. Project consultants ranked this responsibility fourth with a relative index of 0.79. It would seem that consultants will be more encouraged if clients are aware of how their projects will be implemented and managed.

6.3.4 Project definition / formulation

The client's responsibility in 'project definition / formulation' was quantified using three sub-attributes (page 222). The average from these sub-attributes provided the score for 'project definition / formulation' . This was ranked fourth with an index of 0.80. This low ranking is

quite astonishing as this is often associated with the production of the brief which is the most important document in the design process. However, it confirms an earlier study by NEDO (1988) which concluded that most design briefs do not go far enough. Vital information such as time-scale, preferred procurement objectives, etc. are often left out of most design briefs. As a client's responsibility, project consultants ranked *project definition / formulation* second with a relative index of 0.87. This ranking is understandable as it is crucial for them to fully comprehend what the client wants. Clearly, clients do not regard the brief as their responsibility. Perhaps they expect the professionals to do it for them while the professionals are waiting for the clients to come forth with the 'goods'. There need to be a meeting of minds on who is responsible for project definition / formulation.

Table 6.3 Rank order of clients' responsibilities by clients themselves

Responsibilities	% of respondents scoring			Relative Index	Rank
	≤3	4	≥5		
Planning / design	5.1	7.7	87.2	0.85	1st
Project finance	7.7	0.0	92.3	0.84	2nd
Project implementation/ management	5.1	5.1	89.7	0.83	3rd
Project definition / formulation	7.7	10.3	82.1	0.80	4th
Legal agreements	17.9	5.1	76.9	0.80*	5th
Schedule Urgency	10.3	23.1	66.7	0.79	6th
Schedule duration	10.3	17.9	71.8	0.77	7th
Human factors	17.9	30.8	51.3	0.74	8th
Political /social factors	28.2	23.1	48.7	0.69	9th
Contracting	43.6	17.9	38.5	0.65	
10th					

* Equal relative importance indices; ranked in accordance with percentage of respondents scoring 5 or more.

Table 6.4 **Rank order of clients' responsibilities by consultants**

Responsibilities	% of respondents scoring			Relative Index	Rank
	≤3	4	≥5		
Project finance	4.3	2.6	93.0	0.91	1st
Project definition / formulation	0.9	7.8	91.3	0.87	2nd
Planning / design	9.6	11.3	79.1	0.81	3rd
Project implementation / management	7.8	16.5	75.7	0.79	4th
Human factors	13.9	21.7	64.3	0.73	5th
Schedule urgency	16.5	27.8	55.7	0.70	6th
Schedule duration	16.5	26.1	57.4	0.69	7th
Legal agreements	31.3	33.0	35.7	0.59	8th
Contracting	49.6	27.0	23.4	0.51	9th
Political / social factors	46.0	30.4	23.4	0.50	10th

6.3.5 Legal agreements

Was ranked fifth with an overall relative index of 0.80 which is the same as that achieved by *project definition / formulation* discussed above. In accordance with the percentage of respondents scoring 5 or more (Table 6.3), 82.1% in the case of *project definition / formulation* and 76.9% in the case of *legal agreements*, the two were ranked fourth and fifth respectively. *Legal agreement* refers to clients seeking commitment to making the contract work rather than getting involved with litigation. Disputes often lead to litigation which is time consuming and expensive. This responsibility is so ranked because it is of interest to the client that parties to the contract are committed. Project consultants ranked this responsibility eighth with a relative index of 0.59. This is probably because consultants regard securing *legal agreements* as their domain and, therefore, the client should not be too involved in it. Consultants prefer clients not to be too involved with legal matters.

6.3.6 Schedule urgency and schedule duration

These two responsibilities are discussed together because they have a lot in common. Both were ranked sixth and seventh by clients and consultants respectively. This responsibility is so ranked because usually, clients have a time limit within which to complete their projects. *Schedule duration* simply refers to the overall duration of the project. The overall duration of the project is important to both parties as prolongation can impact major changes in output prices, regulation, technical development etc. It is important for consultants to finish a job on time. This is good for their image and it may lead to a repeat business.

6.3.7 Human factors

This refers to the adequacy of senior management support for the project. It is important to remember that project personnel can make mistakes and therefore efforts need be made to minimise these. Clients ranked this responsibility eighth with a relative index of 0.74. The ranking may be explained by the fact that clients have not quite appreciated that the success of their projects also depends on their chosen project personnel. Perhaps project consultants appreciate the importance of this responsibility better, hence ranking it fifth.

6.3.8 Politics / social factors

This refers to fiscal policy, safety and employment regulations and community factors. Clients ranked this responsibility ninth with a relative index of 0.69. The impact of political and social factors on construction projects has previously been recognised (Baker, 1988). The lower ranking is probably because clients feel this is beyond their control. If there is a strike due to some *social issue* or *political instability* there is very little the client can do. This responsibility is the least ranked by project consultants as constituting part of client's responsibilities in the construction process.

6.3.9 Contracting

This refers to the client's knowledge of the available procurement routes. This is the least ranked of all responsibilities by clients with an overall relative index of 0.65 and it is indeed surprising, as project consultants have often been accused of not taking the initiative to explain to their clients the procurement and contractual routes available to them (NEDO, 1988).

Project consultants ranked this responsibility ninth with a relative index of 0.51. Perhaps project consultants consider the choice of a suitable contract type on client's project as their traditional role.

6.4 The responsibilities as perceived by client themselves and consultants

Is there any real agreement between clients and consultants of the relative importance of clients responsibilities in the construction process? To answer this question, a correlation analysis using ranks was conducted. New ranks were assigned to the relative indices, with low relative indices assigned low ranks and high indices high ranks (see Table 6.5). The table summarises the calculation procedure involved to determine the Spearman rank correlation coefficient. Consider *Legal agreements* with rank order of 6.5 and 3 by clients and consultants respectively, which yielded a rank difference of 3.5. The square of which is 12.25. This procedure is then repeated for the remaining clients' responsibilities. The squared differences are then summed to calculate $\sum d_i^2$. Applying the formula for calculating the Spearman rank correlation coefficient denoted r_s :

$$r_s = 1 - \frac{6 \sum_{i=1}^{n} d_i^2}{n(n^2-1)}$$

where: d_i = the difference between ranks;
n = number of pair of values in the data.

As shown in the last column of Table 6.5, the value of $\sum d_i^2$ is 35.5. Therefore,

$$r_s = 1 - 0.215 = 0.785$$

The r_s - value of 0.785 suggest a moderate association between the two sets of ranks. To test r_s assume a significance level of 0.02, the critical values of t for n-2 degrees of freedom are +2.896 and -2.896. The decision rule is "Reject H_0 if t >2.896 or if t <-2.896".

$$t = (0.785)(4.566) = 3.584.$$

Since t > 2.896, we reject the H_0 and conclude that there is a true association of clients'

responsibilities as perceived by clients themselves and project consultants. In other words, the sample correlation of 0.785 is unlikely to have occurred by chance. This would seem to support the hypothesis stated in chapter 4, that the responsibilities of clients in the construction process as perceived by clients themselves and project consultants are similar.

Table 6.5 Association of clients' responsibilities as perceived by clients themselves and project consultants

Clients' responsibilities (i)	Rank order by construction clients (cc_i)	Rank order by project consultants (pc_i)	Difference between ranks ($d_i=cc_i-pc_i$)	Squared diff. (d_i^2)
Legal agreements	6.5	3	3.5	12.25
Project definition /formulation	6.5*	9	-2.5	6.25
Project implementation/ management	8	7	1	1
Project finance	9	10	1	1
Contracting	1	2	1	1
Human factors	3	6	3	9
Planning / design	10	8	2	4
Schedule urgency	5	5	0	0
Schedule duration	4	4	0	0
Political / social factors	2	1	1	1
				$\sum_{i=1}^{10} d_i^2 = 35.5$

*Equal rank (mean value) due to the same relative indices (Table 6.3)

6.5 Summary

Construction clients have certain fundamental needs which must be satisfied in their projects. Achieving these involves accepting some responsibilities in the construction process. These responsibilities have been highlighted and clients demonstrated their willingness to accept them for the sake of sealing the objectives of their projects.

Results indicate the most important needs of clients are: *functionality of the building, safety of the building, quality of the building,* and *completion on time.* All scored above 0.80 on the relative index scale. The most important clients' responsibilities as perceived by clients themselves are: *planning / design, project finance, project implementation / management,* and *project definition / formulation.* The most important clients' responsibilities by project consultants are: *project finance, project definition / formulation, planning / design,* and *project implementation / management.* It should be noted that the ranking of the first four responsibilities by both parties is similar but with different rank orders (See Table 6.3 & 6.4). This shows some degree of agreement on clients' responsibilities as perceived by both clients and consultants, as hypothesised in chapter 4. This was confirmed by a test of the correlation coefficient which confirmed that there is a strong association. It seems that the degree of responsibilities clients accept in the construction process is a function of their experience with the industry (Bennett and Flanagan, 1983; Nahapiet and Nahapiet, 1985; Rowlinson and Newcombe, 1984). Not all clients will be capable of active involvement in their projects, particularly the inexperienced clients.

CHAPTER 7

CHAPTER 7
DETERMINANTS OF THE COMMERCIAL VIABILITY OF CONSTRUCTION CONSULTANCIES

7.1 Introduction

In the last two chapters we paid exclusive attention to the construction clients discussing factors influencing their decision to build; we also discussed and highlighted the fundamental needs of the client including their responsibilities to satisfy these needs. It was concluded that these responsibilities as perceived by clients themselves and project consultants are similar. In this chapter, we turn our attention to the construction consulting firms, discussing their needs and factors affecting their commercial viability.

Construction project realisation is the product of the engagement over different points in time of several organisations with a client system that is itself organisationally complex (Cherns and Bryant, 1984). Simply put, the management of a construction project is a function of a temporary multiorganisation (TMO). These organisations themselves have their own needs and requirements when engaging in construction projects which may conflict with each other to the detriment of the project (Cherns and Bryant, 1984). The unique features of the construction industry usually exacerbate this problem because of the adversarial nature of the contracting parties. This is even more so at times of intense competition in the industry. This chapter focuses on one of these organisations - the consultants - to see how they endeavour to meet their own needs and requirements; at the same time satisfy their clients when engaging in a project. Consultants needs had been identified in chapter 2, in this present chapter we discuss the relative importance of project consultants' needs and requirements with respect to their commercial viability when engaging on construction projects. But first let us examined the characteristics of the consulting firms surveyed.

7.2 Characteristics of the construction consultancies surveyed

As mentioned earlier (Chapter 4) 115 consulting firms responded to the survey giving a response rate of approximately 38%. The type of consultancies surveyed are shown on Table 7.1. Table 7.2 shows the size (i.e number of staff) of the consulting firms.

Table 7.1 Type of consultancies surveyed

Consultancy	Number of respondents	Percentage of respondents
Private consultancy firm	85	73.9
Public consultancy firm	23	20.0
Private multi-disciplinary /integrated practice	7	7.1
Total	115	100

Table 7.2 Size of consultancies surveyed

Size of practice (number of staff)	Number of of respondents	Percentage of respondents
1 - 5	33	28.6
6 - 10	14	12.3
10 - 30	26	22.5
31 - 50	8	7.0
51+	34	29.6
Total	115	100.0

The results indicate that consultants who participated in the study had been in the construction business for an average period of 28 years, and generating an average annual sales volume of £4.04 million. More than 75% of the consultants have been in the business for more than 10 years (Table 7.3), with about two thirds enjoying a turnover of between £0.1 million and £5.0 million in the year preceding the survey (Table 7.4).

Table 7.3 Number of years in the construction business

Years in business	Percentage of respondents
Under 10 years	21.6
10 years - under 20 years	19.8
20 years - under 30 years	24.3
30 years - under 40 years	10.8
40 years - under 50 years	5.5
Over 50 years	18.0

Table 7.4 Turnover of construction consulting firms

Turnover	Percentage of respondents
Under £ 0.1 million	15.5
£ 0.1 million - under £ 1.0 million	38.0
£ 1.0 million - under £ 5.0 million	28.2
£ 5.0 million - under £ 10.0 million	5.6
£ 10.0 million - under £ 15.0 million	4.2
£ 15.0 million - under £ 20.0 million	1.5
Over £ 20.0 million	7.0

The average project size the consulting firms have been involved with are shown in Table 7.5. Whilst total turnover exceeds £20 million for some of the consultants, none is currently involved with a contract sum over £20.0 million, the average project size being under £ 5.0 million. The area of expertise of these consultants are shown on Table 7.6, indicating that about a third do not specialise in a single field of construction, they prefer to diversify.

Table 7.5 Average project size of consulting firms

Contract size	Percentage of respondents
Under £ 1 million	77.2
£ 1.0 million - under £ 5.0 million	17.8
£ 5.0 million - under £ 10.0 million	2.0
£ 10.0 million - under £ 15.0 million	2.0
£ 15.0 million - under £ 20.0 million	1.0
Over £ 20.0 million	0.0

Table 7.6 Specialism of the consultancies

Specialism	*Percentage of respondents*
Civil Engineering Consultancy	11.3
Structural Engineering Consultancy	10.4
Building Services Consultancy	11.3
Project Management Consultancy	2.6
Architectural Consultancy	34.0
Mix	30.4

The kinds of projects the respondents have or are executing are shown in Table 7.7, no consultant was engaged with mining / metallurgy, the majority (45.0%) are dealing with non-residential buildings such as schools, hospitals, shops, offices, community facilities, and government buildings.

Table 7.7 Project Types undertaken by consultancies

Types	Percentage of respondents
Single-family houses	17.9
Multifamily houses	8.6
Nonresidential buildings	45.0
Water supply	4.6
Industrial plants	5.2
Roads and bridges	8.6
Civil airports	1.3
Power and transmission	1.3
Flood control	1.8
Mining and metallurgy	0.0
Others	7.3

7.3 Determinants of commercial viability

So far as the determinants of the commercial viability of the consultancies are concerned, varying numbers from 88 to 95 of the 115 respondents encircled a number for each of the factors ultimately identified (Table 7.8). The table shows a descriptive statistics of the determinants with *high quality design* having the highest mean of 6.44 with a standard deviation of 1.36. *Increase turnover* has the lowest mean (4.27) with a standard deviation of 2.11.

Table 7.8 Descriptive statistics of determinants of commercial viability

Determinants	Mean	Std Dev	Min	Max	No.of Res.
Profit making	6.02	1.77	1.00	7.00	93
Increase Turnover	4.27	2.11	1.00	7.00	88
Positive Cash flow	5.74	0.91	1.00	7.00	94
Good image/prestige	6.09	1.35	1.00	7.00	95
Clarity of clients' needs	5.60	1.76	1.00	7.00	94
Working at full capacity	5.64	1.57	1.00	7.00	94
Client satisfaction	4.90	1.17	1.00	7.00	95
High quality design	6.44	1.36	1.00	7.00	95

As in the last two chapters, the well established relative index ranking technique was used to determine the relative importance of the determinants (Olomolaiye et. al., 1987; Shash, 1993; Kometa et. al., 1994b,1995c). Correlation analysis and the relative index ranking technique enabled a discussion of the relative importance and linear relationships between the determinants.

Examining the indices, we see that all the determinants have indices ranging from 0.70 to 0.92 except *increased turnover* with an index of 0.61 (Table 7.9). This generally indicates that the consultancies surveyed found these factors very important as determinants of commercial viability. Table 7.10 shows a correlation matrix of the determinants.

Table 7.9 Relative importance ranking of determinants of commercial viability

Determinants	Relative importance index	Rank
Profit making	0.86	3rd
Increased Turnover	0.61	8th
Positive Cash flow	0.82	4th
Good image/prestige	0.87	2nd
Clarity of clients' needs	0.80	5th
Working at full capacity	0.78	6th
Client satisfaction	0.70	7th
High quality design	0.92	1st

7.3.1 High quality design

With a relative index of 0.92, the ability to produce *high quality design* ranked the most important determinant of the commercial viability of construction consultancies. This is not surprising bearing in mind the traditional desire of consultants to produce high quality products and the ever increasing importance of the quality of products. Quality assurance procedures and accreditation is the order of the day. Also, clients are demanding more high quality buildings from construction consultancies. It is therefore not surprising that this is reflected in a survey of this nature. The desire to produce *high quality design* correlated significantly with *clarity of clients' needs* with a coefficient of 0.28, which is reasonable indeed as a clearly

stated clients' needs can only help in producing high quality design to satisfy the client.

7.3.2 Good image/prestige

The second most important determinant of commercial viability to the surveyed consultancies was *good image / prestige* with an index of 0.87. Construction consultancies try to portray good image / prestige to clients by diligently working on projects and through trade and specialist associations as mentioned earlier. This determinant is so ranked perhaps because it is one of the prequalification criteria used by clients to select construction companies. Selected to bid for a project give a feeling that they may win the contract. This determinant have a significant correlation coefficient of 0.34 with *working at full capacity*; not surprising as *good image* should attract more clients and work to full capacity although there may not be a causal relationship between the two.

7.3.3 Profit making

Profit making is the third most important determinant of commercial viability with an index of 0.86. The profitability of a business underpins it's commercial survival. Business institutions can not stay in business if they are not realising enough profit for the partners/owners. In most organisations profitability is a measure of growth (Holmes and Sugden, 1990). The third ranking of this determinant is surprising; it was expected to top the list as profitability ensure commercial viability (Handa and Georgiades, 1980). However, the first two determinants attract and retain clients thus ensuring commercial viability in the long run. This determinant correlates significantly with *increased turnover* and *positive cash flow* with coefficients of 0.43 and 0.36 respectively. Increased profit may be due to increased turnover and improvement in cash flow although this is not necessarily causal.

7.3.4 Positive cash flow

The fourth most important determinant of commercial viability was the maintenance of a *positive cash flow* with a relative index of 0.82. Negative cash flow resulting from delay payments from clients have been identified as one of the major causes of business failure in the construction industry (Dun and Bradstreet, 1986). This determinant has a significant but negative correlation coefficient of 0.29 with *working at full capacity*. The only plausible interpretation of this negative coefficient is the possibility of having more payment delays and

Table 7.10 Correlation matrix of the determinants of the commercial viability of construction consulting firms

	Proit making	Increase Turnover	Positive cashflow	Good image/ prestige	Clear clients' needs	Working at full capacity	Client satisfaction	High quality design
Profit making	1.00							
Increase Turnover	0.43**	1.00						
Positive cashflow	0.36**	0.14	1.00					
Good image/prestige	-0.09	0.05	-0.17	1.00				
Clarity of clients' needs	0.00	0.00	-0.02	0.23	1.00			
Working at full capacity	-0.14	-0.06	-0.29*	0.34**	0.19	1.00		
Client satisfaction	-0.02	-0.08	-0.25	0.01	-0.19	0.03	1.00	
High quality design	0.05	-0.09	-0.20	0.00	0.28*	0.24	0.13	1.00

* 1% Significant, ** 0.1% Significant

negative cash flows when consultancies are working on several projects at full capacity.

7.3.5 Clarity of clients' needs

The fifth most important determinant of commercial viability is the adequacy of project information provided by the client especially it's clarity. It is only when clients' needs are fully understood that consultants can satisfy them; since only satisfied clients recommend consultants to others, it is not surprising that clarity of clients' needs which anchors this is considered highly important to commercial viability. As mentioned before *clarity of clients' needs* have a significant correlation coefficient of 0.28 with the desire of construction consultancies *to produce high quality design*. This is expected as *clarity of clients' needs* goes hand in hand with *high quality design.*

7.3.6 Working at full capacity

Working at full capacity is the sixth most important determinant of commercial viability with a relative importance index of 0.78. This determinant ranked sixth because partners / owners want personnel in these firms to be busy to generate most needed income. As mentioned earlier, this determinant has a negative but significant correlation coefficient with *positive cash flow.*

7.3.7 Other determinants

The other determinants of commercial viability are: *client satisfaction* and *increased turnover* with relative importance indices of 0.70 and 0.61 ranking 7th and 8th respectively. Increased turnover is the least important determinant of commercial viability. This implies that the volume of money going through a business does not determine it's survival!

7.4 Factor analysis of the determinants

To understand how the determinants work together in influencing the commercial viability of construction consultancies and to further explore the structure of the data, the Principal Component Factor Analysis (PCFA) technique was employed as in chapter 5. The correlation matrix shown in Table 7.10 passed the suitability test with a determinant of 0.3704 (>0.00001) and the measure of sampling adequacy was found to be 0.5360 (>0.5000).

Table 7.11 shows all the possible number of factors extractable from the analysis. The eigenvalues, percentage of variance and cumulative percentage of variance of all the factors are also shown. However, the important factors are those whose eigenvalues are greater than or equal to 1(the reason for this was mentioned in chapter 5).

Table 7.11 Initial statistics of factor analysis - determinants of commercial viability

Factors	Eigenvalue	Percentage of variance	Cumulative percentage
1	1.978	24.7	24.7
2	1.481	18.5	43.2
3	1.169	14.6	57.8
4	1.065	13.3	71.2
5	0.710	8.9	80.0
6	0.672	6.7	88.4
7	0.496	6.2	94.6
8	0.429	5.4	100.0

Based on eigenvalue being greater than 1, four factors were extracted from the analysis (Table 7.12). The table shows the factor-loadings (except for those less than 0.05) and communalities (h^2) of the determinants of commercial viability. The factor-loadings of the determinant *increased turnover* with the four extracted factors are -0.424, 0.519, 0.337 and 0.392 respectively (Table 7.12). The communality of *profit making* is 0.774, i.e about 77% of the variance is accounted for by the four factors extracted, whereas only 57% of the variance in *working at full capacity* is accounted for. *High quality design* has the highest variance (about 84%) accounted for by the four extracted factors.

Table 7.12 Factor Loadings of determinants of commercial viability - Extracted

Determinants Communal.	Factors				(h^2)
	I	II	III	IV	
Profit making	-0.562	0.502	0.452	-	0.774
Increased Turnover	-0.424	0.519	0.337	0.392	0.717
Clarity of clients' need	0.327	0.638	-0.259	-0.349	0.703
Positive Cash flow	-0.699	0.220	-0.228	-0.162	0.616
Working at full cap.	0.651	0.329	-	0.195	0.573
High quality design	0.439	0.302	0.415	-0.617	0.837
Client satisfaction	0.245	-0.363	0.733	0.117	0.743
Good image/prestige	0.457	0.413	-0.142	0.574	0.730
Eigenvalue	1.978	1.481	1.169	1.065	
Percentage of variance	24.7	18.5	14.6	13.3	
Cum. percentage	24.7	43.2	57.8	71.2	

Note: '-' represent factor loadings less than 0.05

To achieve factor-loadings which are easier to interpret a varimax rotation was carried out on the factors. The rotated factor-loadings are shown on Table 7.13 and are easier to interpret psychologically. It can be seen that the determinants *good image / prestige* and *working at full capacity* are loaded substantially only on factor I; *profit making* and *increased turnover* are loaded only on factor II; *high quality design* and *clarity of clients' needs* are loaded only on factor III; and lastly, *client satisfaction* and *positive cash flow* are loaded only on factor IV. For clarity, factor I can be regarded as containing issues pertaining to construction consultancies **drive to operate at full capacity**. Factor II involve **drive for financial stability**; factor III **drive to produce high quality design** and factor IV **drive to**

satisfy clients. This is a means of naming the extracted factors. This is necessary particularly if further analysis is to be conducted on the extracted factors.

Table 7.13 Factor Loadings of determinants of commercial viability - Rotated

Determinants	Factors				Communal.
	I	II	III	IV	(h^2)
Good image/prestige	0.843	0.064	-0.093	-0.077	0.730
Working at full cap.	0.688	-0.100	0.284	0.090	0.573
Profit making	-0.209	0.841	0.144	-	0.774
Increased turnover	0.155	0.821	-0.139	-	0.717
High quality design	-	-	0.894	0.195	0.837
Clarity of clients' need	0.317	-	0.600	-0.493	0.703
Client satisfaction	-	-	0.070	0.859	0.743
Positive Cash flow	-0.436	0.380	-0.142	-0.511	0.616
Eigenvalue	1.978	1.481	1.169	1.065	
Percentage of variance	24.7	18.5	14.6	13.3	
Cum. percentage	24.7	43.2	57.8	71.2	

Note: '-' represent factor loadings less than 0.05

Taking the eigenvalues as a measure of importance of the factor groupings, it is evident that **drive to operate at full capacity** is the most important to construction consultancies having the highest value of 1.978, this is not surprising in the very competitive business environment of the construction industry where there is shortage of work. This is followed by **drive for financial stability**; **drive for the production of high quality design** and **drive to satisfy clients** with eigenvalues of 1.481, 1.169, and 1.065 respectively. The derived factors working together explained 71.2% of the variance of the determinants of

commercial viability. The four factors extracted explain different dimensions of determinants of construction consultancies' commercial viability. Scatter plots of the four factors in two dimensional subspace are shown on Figures. 7.1 to 7.3. This shows that the four factors are the only principal component extraction from the data. Data points are not concentrated in any given area of the curves.

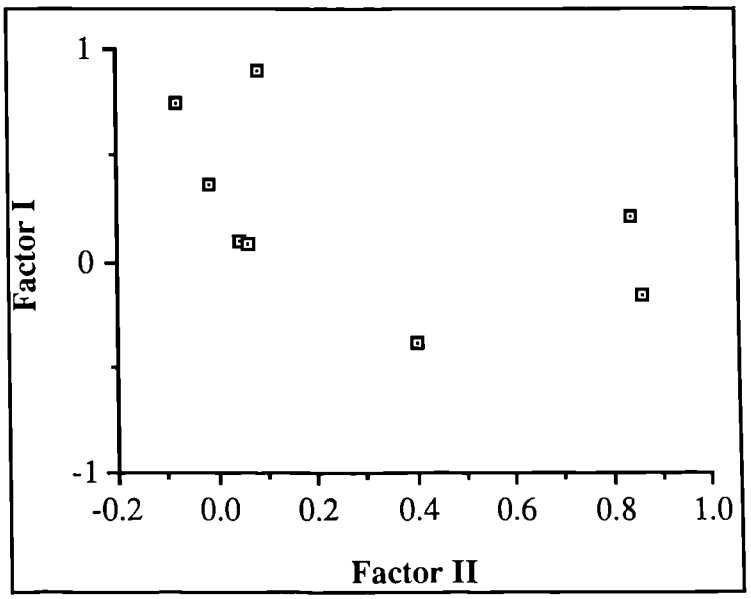

Figure 7.1 Factor I Vs. Factor II - Commercial Viability Factors

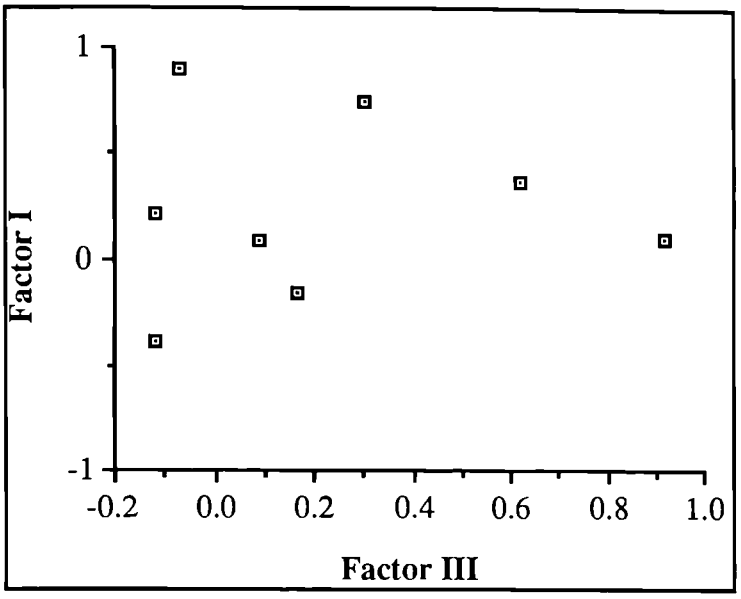

Figure 7.2 Factor I Vs. Factor III -Commercial Viability Factors

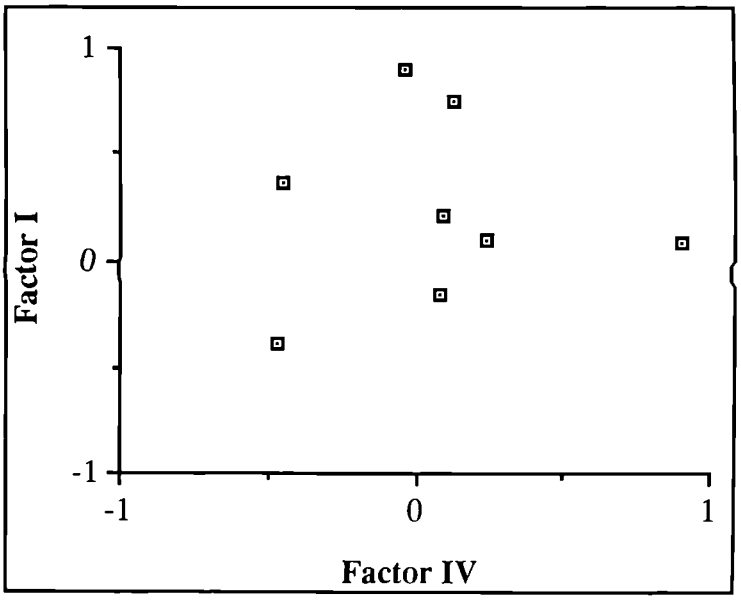

Figure 7.3 Factor I Vs. Factor IV - Commercial Viability Factors

7.4.1 Drive to operate at full capacity - Factor I

This consists *good image/prestige* and *working at full capacity*. As mentioned earlier, *good image/prestige* of construction consultancies help attract clients and explains why most consulting firms join trade / specialist association and senior partners join prestigious clubs and other networks to enhance their image. The more the clients the more the likelihood of operating at or near full capacity.

7.4.2 Drive for financial stability - Factor II

This consists *profit making* and *increased turnover*. Both factor I and factor II work hand in hand; construction consultancies will not be able to operate at full capacity if not financially stable. The drive to optimise resource utilisation will eventually lead to *increased turnover* and while this will not necessarily lead to more profit in the short run it may result in a more secured financial future for the company.

7.4.3 Drive to produce high quality design - Factor III

With better financial stability comes the desire for higher quality design and more prestigious projects; perhaps as part of an attempt to expand or have better satisfied clients which may lead to repeat business. The two determinants under this factor are *high quality design* and *clarity of clients' needs*.

7.4.4 Drive to satisfy clients - Factor IV

This consists *client satisfaction* and *positive cash flow*. The latter was expected to be grouped under factor II above because it has a direct bearing on financial stability. Possibly consultants think a satisfied client will pay them on time to enhance their cash flow but the reasons for timely payment for services rendered may not be simply due to whether the client is satisfied or not. Some satisfied clients still default.

7.5 Correlation of derived factors with client attributes

The commercial viability of construction consultancies is influenced by other external factors such as clients' organisational attributes, project specific characteristics and the prevailing market conditions. Client attributes influencing the performance of construction consultancies have been highlighted in chapter 4, grouped under ten main attributes. These include: client

financial stability, client corporation with feasibility study, quality of management within client organisation, organisational quality of client, characteristics of client project, client characteristics, client past experience, client past performance, client duties, and current market conditions. Also see Kometa et. al. (1994b). To determine the impact of these attributes on the commercial viability of construction consultancies, it was necessary to correlate each of the ten attributes with the four extracted factors (Table 7.14). This was achieved by taking the mean of the variables under each derived factor and correlating them with the ratings of the main client attributes.

Three of the extracted factors I, II and IV had significant correlation coefficients with most of the attributes. Factor III (drive to produce high quality design) did not have any significant correlation with any of the attributes but had the highest coefficient of 0.61 with *client duties* indicating that construction clients influence the production of high quality design in the construction process. While not causal the correlation analysis would suggest that construction consultancies who desire financial stability should pay some attention to the following attributes: quality of management within client organisation, project characteristics, past experience of client and the prevalent market conditions.

Table 7.14 Correlations between the extracted Factors and clients attributes

Clients / project attributes	Commercial Viability Factors			
	I Drive to operate at full capacity	II Drive for financial stability	III Drive to produce high quality design	IV Drive to satisfy clients
Client financial stability	0.26*	0.31	0.29	0.24**
Client corporation with the feasibility study	0.43	0.34	0.45	0.25**
Quality of management within client organisation	0.15***	0.20**	0.35	0.17***
Organisational quality of client	0.18***	0.20**	0.39	0.26*
Characteristics of client project	0.19**	0.15***	0.34	0.17***
Client characteristics	0.26*	0.30	0.40	0.13
Client past experience	0.25*	0.24**	0.30	0.19**
Client past performance	0.20**	0.37	0.38	0.24**
Client duties	0.37	0.44	0.61	0.33
Current market conditions	0.22**	0.16***	0.32	0.17***

*p<0.001; **p<0.01; ***p<0.05

7.6 Summary

The survival of construction companies particularly consulting firms in the construction industry has been a cause of concern for many. This chapter has investigated variables influencing the commercial viability of construction consultancies. The variables were factor analysed and four major factors extracted: drive to operate at full capacity (good image/prestige, working at full capacity); drive for financial stability (profit making, increased turnover); drive to produce high quality design (high quality design, clarity of clients' needs); and drive to satisfy clients (client satisfaction, positive cash flow).

Being aware that commercial viability also depend on external factors, the four factors extracted

were correlated with clients' attributes identified as influencing the performance of construction consultancies. Significant correlation coefficients were obtained for three of the four factor groupings i.e, drive to operate at full capacity, drive for financial stability, and drive to satisfy clients; indicating that client organisational attributes and project specific characteristics influence the commercial viability of consulting firms. Paying attention to client attributes consulting firms can monitor and control their commercial viability. This would involve a sound corporate strategy.

CHAPTER 8

CHAPTER 8
ATTRIBUTES OF CONSTRUCTION CLIENTS INFLUENCING PROJECT CONSULTANTS' PERFORMANCE

8.1 Introduction

The preceding chapter examined the characteristics of construction consulting firms that participated in this investigation and discussed the factors influencing their commercial viability. It was concluded by correlating the determinants of commercial viability with client attributes. Significant correlation coefficients were obtained thus establishing a firm relationship between clients' organisational attributes and the commercial viability of consulting firms. Client attributes and project characteristics are examined in more detail in this chapter as a necessary step in client evaluation. Without a thorough understanding of clients' attributes, it would be difficult to fully appreciate the potential risks clients pose to project consultants.

Whilst some investigations relating to a small range of attributes have been conducted on clients (Stocks and Male 1983; Bryant et. al. 1969; Friend et. al. 1974), only Bresnen and Haslam (1991) have carried out a comprehensive study of the attributes of construction clients. Their study was, however, limited to size, sector, experience, management structure and project characteristics; and mostly concentrated on contractual and project management practices in client organisations. The clients' attributes as identified from the literature review were presented and discussed in chapter 4.

8.2 Frequency of client evaluation

The consultants as a whole have worked for a variety of clients. For convenience, client type has been categorised as follows: developer, private, and public clients (see chapter 2), who account for 43.2%, 34.2%, and 22.6% respectively of the consultant market (Fig. 8.1). Developers commissioned more projects than any other client type. However, public clients (e.g local and central government) account for about one half of all receipts to consulting firms. The data obtained, especially those relevant to the evaluation of the importance of the attributes affecting consultants' project performance are considered highly reliable because of the

experience of the respondents.

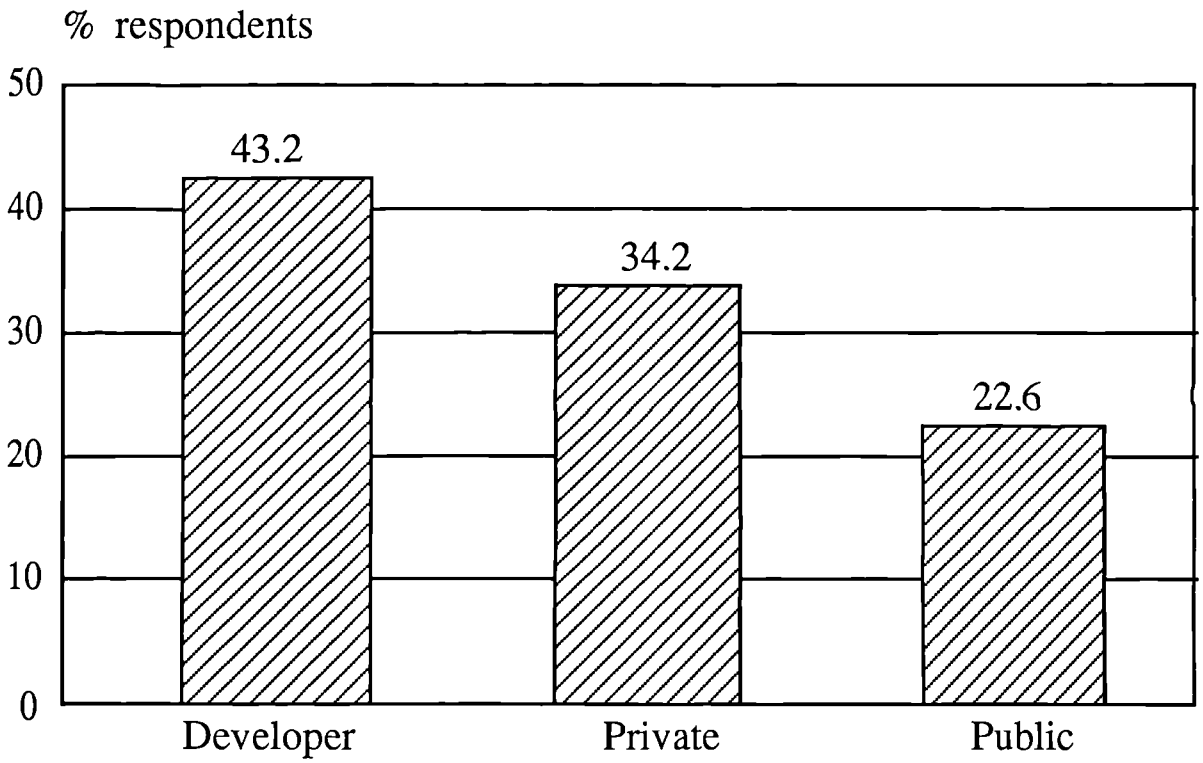

Figure 8.1 Proportion of clients that make up the consultants' market

The construction consulting firms who participated in this investigation were asked how often they evaluated their clients before embarking on the project. Surprisingly, less than 2.0% of consultants evaluate their clients regularly while more than one half do none at all (Table 8.1). The reasons may relate to custom and practice in that consultants have confidence in their clients or are simply following the view that the 'customer is always right' (Dun and Bradstreet, 1986). Of the consultants who always evaluate their clients, only 17.9% have established procedures while 82.1% evaluate only in an ad-hoc manner, based on experience.

Table 8.1 Frequency of client evaluation by consultants

Frequency	Percentage of respondents
Never	51.8
Sometimes	46.4
Always	1.8

8.3 Clients' attributes affecting consultants' performance

Participating consulting firms provided numerical scores on a seven point Likert scale of their opinion of the effect of each of the identified attributes on their ability to carry out a project successfully. These scores were then transformed to importance indices to determine the relative ranking of the attributes as in chapter 5.

To demonstrate the calculation of the relative importance index, consider a sub-attribute of 'project feasibility' namely 'project priorities'. Each of the 115 respondents rated *this sub-*attribute with a number between 1 to 7 depending on its impact on client project feasibility. The sum total of all their ratings is 636, using the formula stated in chapter 5,

Relative Importance Index for 'project priorities' = 636 / 7*115 = 0.79.

Table 8.2 show the relative importance indices and ranking for the 10 main attributes, as separately assessed. Examining the indices, we can see that all the factors except the client's characteristics (i.e type, size, structure, communication channels, etc.) scored 0.50 or more on the relative index scale. In fact, *client characteristics* scored 0.49 (Table 8.2). Generally, consultants find these attributes very important for their project performance and hence their commercial viability.

As we shall be drawing important inference from scores provided by the respondents it is an important statistical step to test the data for normality; because most statistical packages assume a normal distribution for the population. The normality tests show that the score for each attribute is normally distributed at least at 93% level of significance (Table 8.3). In fact, all the attributes except two (financial stability and organisational quality) are normally distributed at 95% level of significance. These two attributes are normally distributed at 93% and 94% level of significance respectively. Based on the confirmation of the normality test it is possible to proceed with the analysis of the data using normal distribution statistics.

The frequency distributions for all ten attributes are shown in Figs. 8.2 to 8.11. Means and standard deviations are also shown on the figures. *Project feasibility* has the highest mean followed by *financial stability*, indicating that most respondents rated these two attributes with higher scores. *Current market condition* , not strictly a client attribute, has the lowest mean. The standard deviations for these attributes are respectively 1.50, 1.07 and 1.45. The frequency distribution were generated in order to see a clearer picture of the distributions. They were generated by tallying up the number of respondents who rated a particular attribute with the same score. The figures show that the data is not too skewed in a given direction.

It should be appreciated that in question 2b (page 228), respondents scored the main attributes independently and in questions 3 (page 229) and 4 (page 230) they scored the sub-attributes under their respective main attributes. Scores from the sub-attributes were combined to arrive at scores for each main attribute. The resulting scores were then added to those independently assessed and the average calculated. Figures 8.2 to 8.11 were generated using this final average because we were interested in the general distribution of the main attributes' scores provided by respondents. In subsequent analysis particularly in the calculation of relative importance index of main attributes, the independently assessed scores of the main attributes were ignored. This is because at the subsequent stage of data analysis we were more interested at the effect of the influence of the sub-attributes on their respective main attributes. Moreover, in evaluation of clients, consultants are required to assess only the sub-attributes (see chapters 9 and 10).

Table 8.2 Ranking of the main attributes of clients' organisation affecting consultants' project performance.

Attributes	Percentage of respondents scoring: ≤3	4	≥5	Relative Important Index	Rank
Feasibility of project	17.00	16.78	66.22	0.89	1st
Financial stability of clients	15.53	26.63	57.84	0.86	2nd
Client's duties	19.64	20.42	59.94	0.77	3rd
Past performance	22.10	16.50	61.40	0.67	4th
Project characteristics	27.53	19.14	53.33	0.67*	5th
Organisational quality	26.20	28.07	45.73	0.60	6th
Client past experience	34.13	22.53	43.34	0.58	7th
Current market conditions	47.40	30.45	22.15	0.57	8th
Quality of management	37.28	28.68	34.04	0.53	9th
Client characteristics	38.02	21.80	40.18	0.49	10th

*Equal relative importance indices; ranked in accordance with the percentage of respondents scoring 5 or more

Table 8.3 Normality test of clients' attributes

Attributes	Statistic	Significance
Financial stability	0.150	0.071
Project feasibility	0.185	0.035
Quality of management	0.175	0.043
Organisational quality	0.158	0.061
Project characteristics	0.178	0.040
Client characteristics	0.159	0.059
Past experience	0.185	0.035
Past performance	0.214	0.018
Client duties	0.204	0.023
Current market condition	0.223	0.015

Table 8.4 has been produced mainly to compare the sub-attributes among themselves using their relative importance indices. It also helps in the ranking of the sub-attributes under their respective main attributes in cases where the sub-attributes have the same relative importance indices (see Table 8.5). Close examination indicates that all sub-attributes except *legal history of clients*, *client experience with quality assurance*, *state of the economy* (*recession*) and *size of client* scored 0.50 or more on the relative index scale. These sub-attributes scored 0.13, 0.47, 0.48 and 0.42 respectively. With the exception of these four sub-attributes, all the others identified have very important effects on the main attributes and hence the project consultants' performance. *Client project financing*, *project definition / formulation*, *time available for project completion*, and *client project planning* are the most important to consultants. They all scored more than 0.80 on the relative index scale.

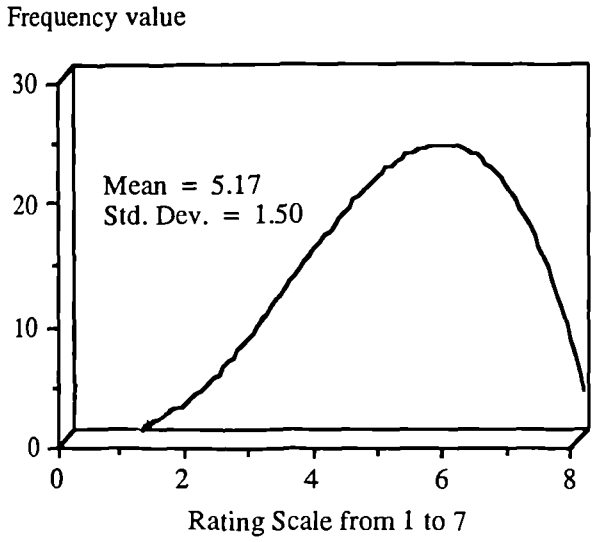

Figure 8.2 Frequency Distribution of 'Client Financial Stability'

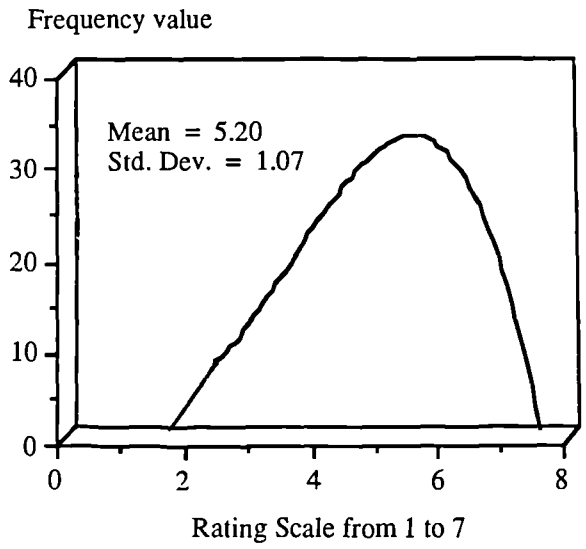

Figure 8.3 Frequency Distribution of 'Project Feasibility'

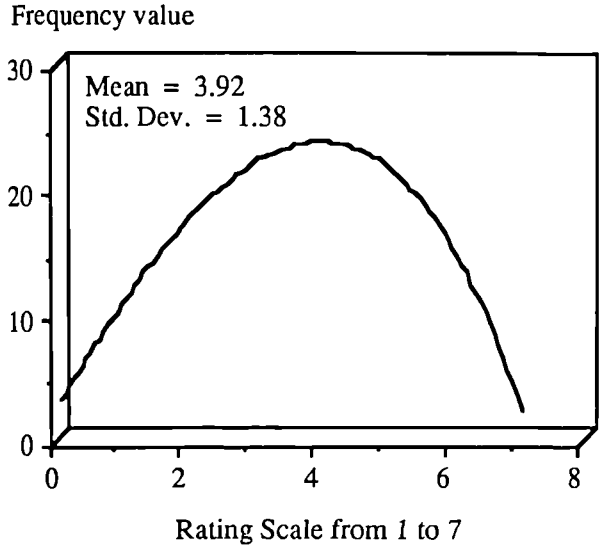

Figure 8.4 Frequency Distribution of 'Quality of Management'

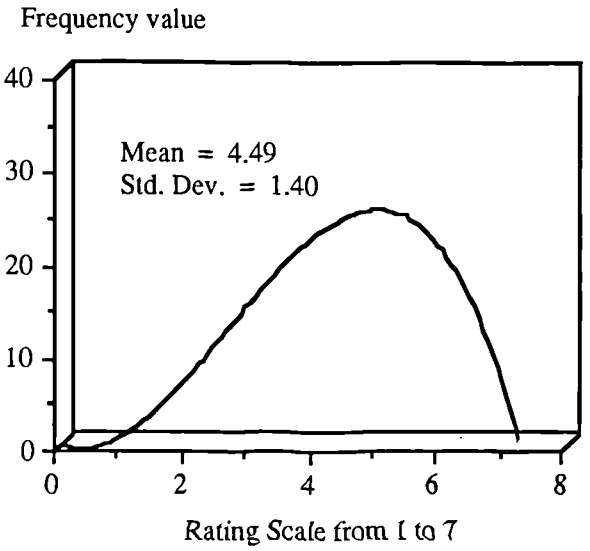

Figure 8.5 Frequency Distribution of 'Project Characteristics'

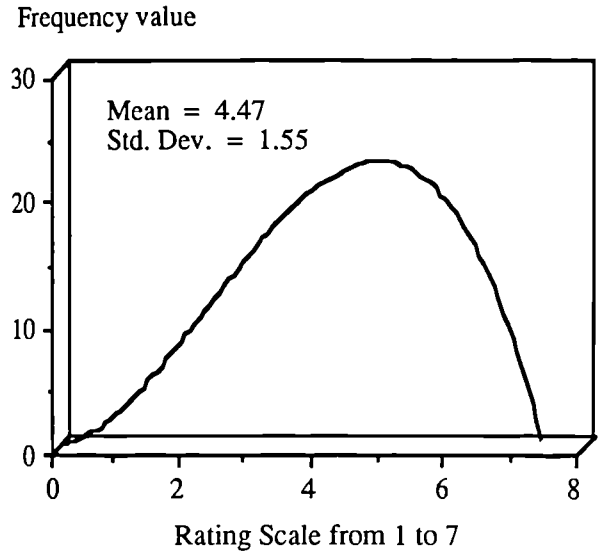

Figure 8.6 Frequency Distributionof 'Organisational Quality'

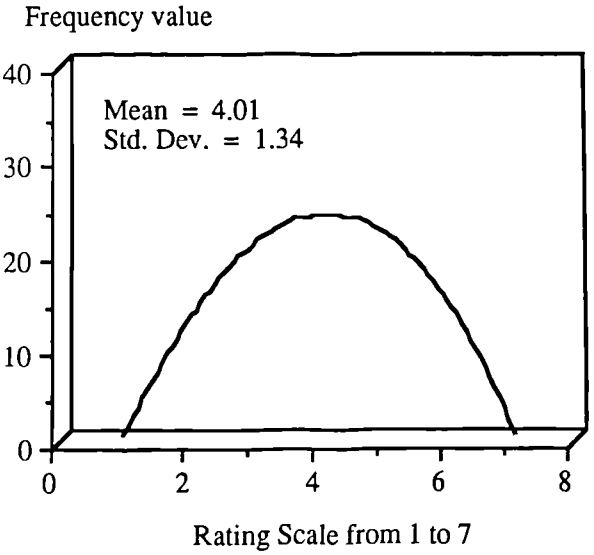

Figure 8.7 Frequency Distributionof 'Client Characteristics'

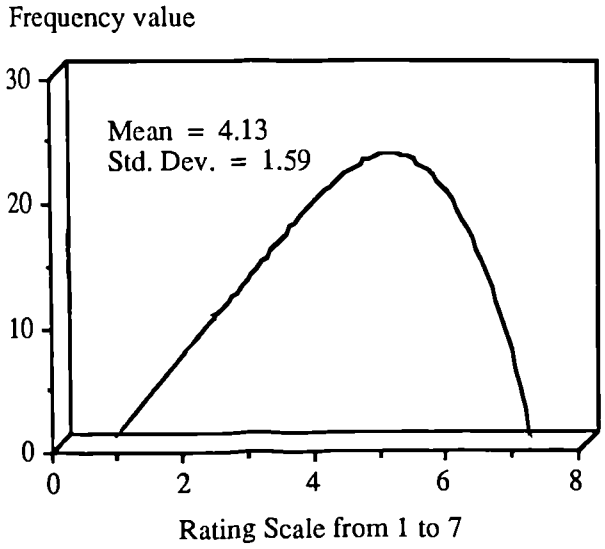

Figure 8.8 Frequency Distribution of 'Past Experience'

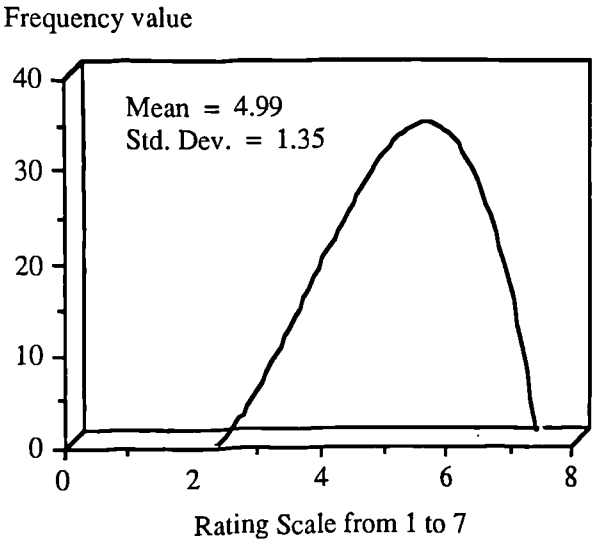

Figure 8.9 Frequency Distribution of 'Past Performance'

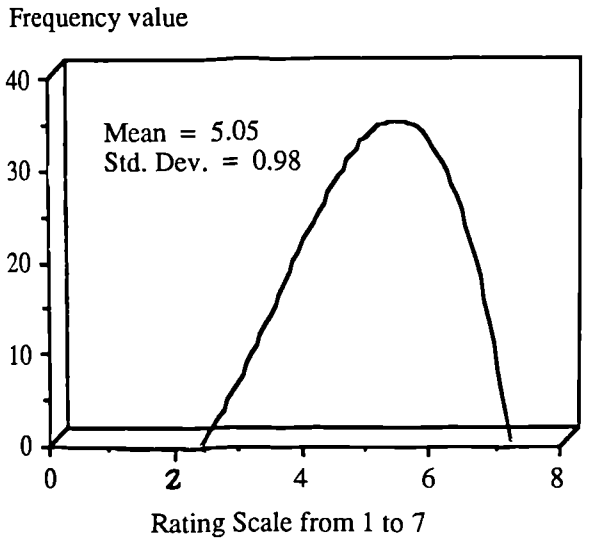

Figure 8.10 Frequency Distribution of 'Client Duties'

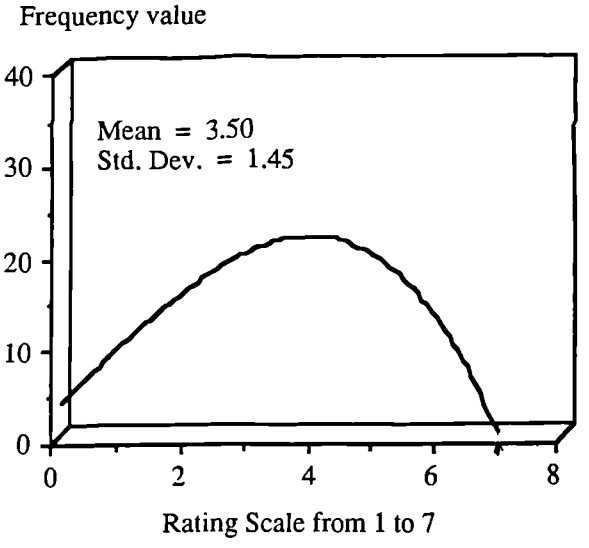

Figure 8.11 Frequency Distribution of 'Current Market Conditions'

In addition to the relative index scale, the percentage of respondents scoring 3 or less, 4 (the midpoint), and 5 or more on the developed scale was calculated for each of the attribute; and this was used to rank the attributes where their relative importance indices are equal. The interval scale was transferred into a nominal scale, i.e a score of 3 or lower represents a weak effect on consultants' performance, a score of 4 represents a moderate effect, and a score of 5 or more represents a strong effect (see Fig. 8.12).

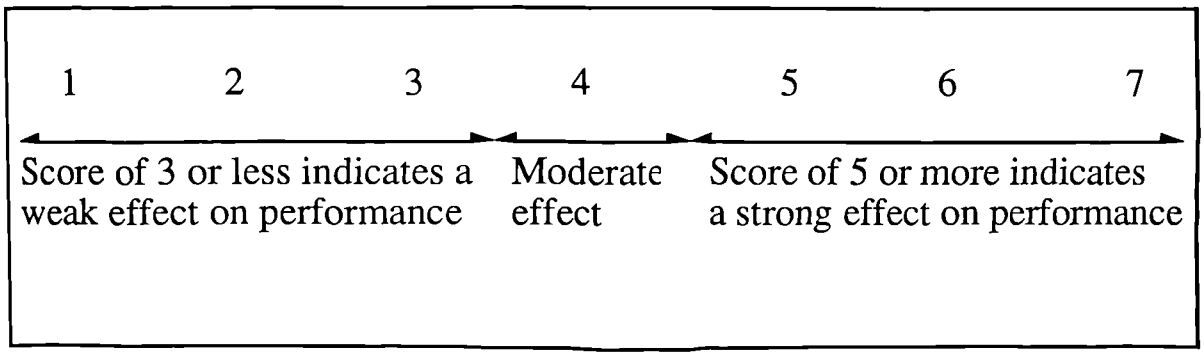

Figure 8.12 Nominal Scale

Table 8.4 Sub-attributes of client's organisation affecting consultant's performance

Sub-attributes	Percentage of respondents scoring: ≤3	4	≥5	Relative Importan. Index
Client project financing	4.35	2.61	93.04	0.91
Project definition / formulation	0.87	7.83	91.30	0.87
Time available for project completion	6.51	11.21	82.24	0.81
Client project planning	9.57	11.30	79.13	0.81*
Client determination of project priorities	6.48	9.26	84.26	0.79
Project implementation / management	7.83	16.52	75.65	0.79*
Project objectives and sub-objectives	8.33	20.37	71.30	0.77
Client contribution to project feasibility study	9.26	11.11	79.63	0.76
Client credit worthiness	10.19	24.07	65.74	0.76*
Time overruns due to client	17.92	15.09	66.98	0.74
Cost overruns due to client	17.59	15.74	66.67	0.74*
Quality achieved in past projects	16.51	13.76	69.72	0.73
Human factors	13.91	21.74	64.35	0.73*
Client current liabilities	14.68	26.61	58.72	0.72
Communication channels	18.69	18.69	62.62	0.71
Schedule duration	16.52	26.09	57.39	0.70
Schedule urgency	16.52	27.83	55.65	0.70*
Client appointment of personnel	21.30	22.22	56.48	0.68
Allocation of project responsibilities	23.15	23.15	53.70	0.68*
Client current assets	21.70	29.25	49.06	0.66
Experience of client personnel	23.15	21.30	55.56	0.65
Number of unsuccessful projects	30.28	15.60	54.13	0.64
Project complexity	30.84	19.63	49.53	0.63
Number of successful project completed	28.16	22.33	49.51	0.63
Type of project	39.25	27.10	33.64	0.63*
Type of client	32.11	23.85	44.04	0.62
Organisation of project team	25.93	27.78	46.30	0.61
Project site condition	30.91	24.55	44.55	0.61*
Cost of the project	36.45	19.63	43.93	0.59
Client project management	30.56	27.78	41.67	0.59
Coordination of project interphase	29.63	33.33	37.04	0.59
Legal agreements	31.30	33.04	35.65	0.59*
Qualification of client personnel	32.41	27.78	39.81	0.58
Size of project	35.19	21.30	43.52	0.57
Number of project completed	34.26	22.22	43.52	0.55
Involvement with the construction industry	39.81	19.44	40.74	0.55*
Client experience with project auditing	37.04	33.33	29.63	0.54
Economic boom	42.61	31.30	26.09	0.53
Types of projects completed by clients	39.25	27.10	33.64	0.52
Client structural organisation	44.04	24.77	31.19	0.52*
Project location	44.86	24.30	30.84	0.51
Client knowledge of contracting routes	49.57	26.96	23.48	0.51*
Politics / social factors	46.09	30.43	23.48	0.50
Economic recession	52.17	29.57	18.26	0.48
Client experience with quality assurance	49.07	25.93	25.00	0.47
Size of client	35.19	21.30	43.52	0.42
Legal history of client organisation	33.33	22.22	44.44	0.13

*Equal relative importance indices; placed in accordance with the percentage of respondents scoring 5 or more.

Table 8.5 Relationship between the main and the sub-attributes

Attributes/sub-attributes	Relative important index of subattributes	Ranks of subattributes	Overall Index for main attributes	Overall rank main attributes
PROJECT FEASIBILITY			**0.71**	**1**
-Project priorities	0.79	1		
-Feasibility study	0.76	2		
-Site condition	0.68	3		
-Personnel appointment	0.61	4		
	x=0.71			
CLIENT'S DUTIES			**0.71**	**2**
-Project finance	0.91	1		
-Project definition / formulation	0.87	2		
-Planning and design	0.81	3		
-Project implementation/management	0.79	4		
-Human factors	0.73	5		
-Schedule duration	0.70	6		
-Schedule urgency	0.70*	7		
-Legal agreements	0.59	8		
-Contracting	0.51	9		
-Politics / social factors	0.50	10		
	x=0.71			
FINANCIAL STABILITY			**0.71**	**3**
-Credit worthiness	0.76	1		
-Current ratio :Current liabilities	0.72	2		
:Current assets	0.66	3		
	x=0.71			
PAST PERFORMANCE			**0.70**	**4**
-Cost overrun	0.74	1		
-Time overrun	0.74*	2		
- Quality achieved	0.73	3		
-Unsuccessful projects	0.64	4		
-Successful projects	0.63	5		
	x=0.70			
PROJECT CHARACTERISTICS			**0.64**	**5**
-Time	0.81	1		
-Objectives / sub-objectives	0.77	2		
-Complexity	0.63	3		
-Type of project	0.63*	4		
-Cost of project	0.59	5		
-Size of project	0.57	6		
-Location	0.51	7		
	x=0.64			
ORGANISATIONAL QUALITY			**0.63**	**6**
-Allocation of project responsibility	0.68	1		
-Organisation of project team	0.61	2		
-Organisation of project interphase	0.59	3		
	x=0.63			
PAST EXPERIENCE			**0.57**	**7**
-Experience of personnel	0.65	1		
-Project completed	0.55	2		
-Construction activities	0.55*	3		
-Types of projects	0.52	4		
	x=0.57			
QUALITY OF MANAGEMENT			**0.55**	**8**
-Project management	0.59	1		
-Qualification of personnel	0.58	2		
-Project auditing	0.54	3		
-Quality assurance	0.47	4		
	x=0.55			
CURRENT MARKET CONDITIONS			**0.51**	**9**
-Economic boom	0.53	1		
-Economic recession	0.48	2		
	x=0.51			
CLIENT CHARACTERISTICS			**0.48**	**10**
-Communication	0.71	1		
-Type of client	0.62	2		
-Structure	0.52	3		
-Size of client	0.42	4		
-Legal history	0.13	5		
	x=0.48			

x = mean index of sub-attributes giving overall index of main attributes

* Equal relative importance indices; ranked in accordance with percentage of respondents scoring 5 or more (see Table 8.4)

Table 8.5 shows the relationship between the main and the sub attributes. The overall index and hence rank of the main attributes calculated from the relative importance indices of the sub-attributes using the following formula:

$$\text{Overall index of main attributes}_i = \frac{\sum_{i=1}^{n} \text{Relative importance index of sub-attribute}_i}{n}$$

where n = number of sub-attributes constituting a main attribute

Consider 'project feasibility', its sub-attributes i.e project priorities, feasibility study, site condition and personnel appointment have relative indices of 0.79, 0.76, 0.68 and 0.61 respectively (Table 8.5). Therefore, overall index for 'project feasibility' = (0.79+0.76+0.68+0.61) / 4 = 0.71. The overall indices calculated were then used to rank the main attributes as show on Table 8.5.

8.3.1 Project feasibility

The distribution of scores for this attribute is shown in figure 8.3. Taking the relative indices as an aggregate measure of importance of the attributes, *project feasibility* ranked highest amongst the attributes affecting consultants' project performance with an overall index of 0.71. 66.22% of all respondents ranked this attribute with a score of 5 or higher. Under *project feasibility*, the sub-attributes: *project priorities*, *feasibility study*, *site condition*, and *appointment of client personnel* ranked first, second, third, and fourth respectively (Table 8.5). Clear indication of project priorities and client contribution to the feasibility study are very important to consultants as recognised earlier by Gruneberg &Weight (1990), and Walker (1989).

8.3.2 Client's duties

This was discussed in great detail as the responsibilities of clients in chapter 6. Of the attributes identified, *client's duties* ranked second with an overall relative index of 0.71 (Table 8.5). 59.94% of all respondents ranked this attribute with a score of 5 or higher; for

distribution of scores see Figure 8.10. This importance was earlier recognised by Morris and Hough (1986). The most important sub-attributes under this are *project finance*, *project definition / formulation*, and *planning and design* which ranked first, second, and third respectively. The least important sub-attributes under this are client involvement in *legal agreements*, *contractual matters* and *politics/social factors*. The respondents in this survey seem to indicate that clients are not very conscious of legal implications of the contracts they enter into with consultants. The consultants possibly take advantage of this and do not often take the initiative to explain to their clients the procurement and contractual routes available to them (NEDO, 1988). The relative indices of these sub-attributes: *legal matters* and *contracting*, 0.59 and 0.51 respectively still accord them some importance.

8.3.3 Financial stability

With an overall index of 0.71, financial stability of client was ranked the third most important attributes affecting project consultant's performance. 57.84% of all respondents ranked this attribute with a score of 5 or more (Fig. 8.2). Since the consulting firm is a profit seeking organisation in a predominantly economic world, this ranking should not be surprising. Singularly, this attribute ranked second (Table 8.2), but with relative ranking of its sub-attributes achieved a third position overall. The sub-attributes are *credit-worthiness*, *current liabilities*, and *current assets* which ranked first, second, and third respectively (Table 8.5). The credit worthiness of clients is far more important to consultants than the other two sub-attributes because banks could provide overdraft facility to the client if he/she runs into financial difficulties. The importance of financial stability and its sub-attributes in the running of any business organisation had previously been recognised by Foster (1986), Russell and Skibniewski (1988), and Pilcher (1992).

As seen above, the first three main attributes have a relative index score of 0.71 and were separated according to the number of respondents scoring 5 or more (Table 8.2).

8.3.4 Past performance

With an overall index of 0.70, past performance of client was ranked the fourth most important attributes affecting project consultant's performance. When the effects of the sub-attributes

were included it still achieved an overall fourth ranking (see Tables 8.2 & 8.5). The sub-attributes include: *cost overrun* (0.74), *time overrun* (0.74), *quality achieved* (0.73), *number of unsuccessful projects* (0.64), and *number of successful projects completed* (0.63) ranking first, second , third, fourth, and fifth respectively. *Cost overrun* and *time overrun* with the same relative index of 0.74, were separated by the percentage of respondents scoring 5 or more; 66.98% for the former and 66.67% for the later (see Table 8.4). *Cost overrun* due to design changes by client was ranked first, because it is the main cause of problems during the design process and even during construction. This inevitably leads to *time overrun* which may cause serious disruption to a consultant or contractor's progress of work. *Quality achieved* which was ranked the third sub-attribute under this attribute may be explained by the traditional desire for quality designs by consultants. This is good for the image of the firm and may help to attract more clients.

8.3.5 Project characteristics

The consultants ranked *project characteristics* fifth with an overall index of 0.64. Considering the effects of the sub-attributes, its overall ranking remained fifth. The characteristics of a project which is a function of the sub-attributes of *time*, *type of project*, *cost of project*, *objectives / sub-objectives*, *complexity*, *size*, and *location* are very crucial for the project success (Walker, 1989; Lock, 1987). *The most important sub-attributes* here are *time for completion*, *objectives / sub-objectives* of project, and *complexity* of project which ranked first, second, and third respectively (Table 8.5).

8.3.6 Organisational quality

This was ranked sixth with an overall relative index of 0.63. The manner in which the client organises and conduct the project in turn affect consultants' performance and indeed any other party involved. The sub-attributes are: *allocation of project responsibility*, *organisation of project team*, and *coordination of project interphase* which ranked first, second and third respectively. *Allocation of project responsibility* ranked the first sub-attribute because it is pertinent for all the parties involved in a project to know their roles and thereby reduce conflict amongst the parties. It also gives consultants some confidence that the client knows what he/she is doing. *Organisation of project team* ranked second possibly because

construction projects always required several teams to work together. The way the team is organised should be of interest to all the parties involved in the project including the consultants. Good team work should improve project performance. The *coordination of project interphase* which ranked third is also important because the various parts of the project have to be coordinated to produce an integral whole. For instance, the design part may perform well in terms of time, cost, and quality but the performance of the project as whole may still be jeopardised if the construction phase is not well coordinated.

8.3.7 Past experience

Consultants ranked *past experience* of the client seventh with an overall relative index of 0.57 (Table 8.5). The lower ranking of this attribute is a bit surprising. One would think that consultants would accord this attribute more importance because the past experience of clients will often influence the way they conduct a new project. Relative to the other attributes discussed above, it probably deserves this position because in as much as consultants prefer to work with experienced clients, they are also willing to work with new client provided they are actively involved with the project. The sub-attributes are: *experience of client personnel*, *number of projects completed*, *client involvement in construction activities*, and *types of projects completed* ranking first, second, third, and fourth respectively. *Number of project completed* and *client involvement in construction activities* with the same relative index of 0.55 were separated by the percentage of respondents scoring 5 or more (see Table 8.4). *Experience of client personnel* ranked first under this attribute because it reflect the fact that personnel had been involved in many projects before and hence are conversant with construction matters. *Number of projects completed* ranked second; it maybe assumed that the more projects the client has completed the more his/her experience would be in construction matters. *Types of project* ranked fourth, this is surprising as consultants are mostly experienced in certain types of projects. A third of all consultants in this investigation do not specialise in a single type of project but diversify. Perhaps recent economic realities is temting consultants to enter into new market areas.

8.3.8 Quality of management

This was ranked eighth with an overall relative index of 0.55. The lower ranking of this

attribute is surprising; perhaps consultants do not expect much from clients' management team which would be really absurd since Bresnen and Haslam (1991) found that more and more clients are keen to be involved with the management of their projects. Surely their managerial quality can not be over looked. The sub-attributes are *client project management experience*, *qualifications of client personnel*, *project auditing*, and *quality assurance* ranking first , second, third, and fourth respectively.

8.3.9 Current market conditions

This attribute ranked ninth with an overall index of 0.51. Do construction clients take advantage of consultants during recession when they know that consultants are desperate for work? It is not uncommon for construction professionals to accept work from clients which literally burns their hands during economic recession (Nunn,1993). The sub-attributes are *economic boom*, and *recession* ranking first and second respectively.

8.3.10 Client Characteristics

This attribute was ranked tenth with an overall relative index of 0.48 (see Table 8.5). This indicates that *client characteristics* is the least important of the identified attributes affecting the consultant's performance. The sub-attributes are *communication channels*, *type of client*, *structure*, *size of client* and *legal history* of client ranking first, second, third, fourth, and fifth respectively. *Communication channels* which ranked first is highly important to consultants because this is the only means through which consultants could appreciate the client's needs and requirements. *Legal history* of client which ranked fifth is the worst rated of all the sub-attributes, probably because the consultants need not fear litigation if they know they will perform well. Please note that all rankings above are relative.

8.4 Summary

Client organisational variables affect consultants' performance which in turn affect overall project performance. All the main attributes except, *client characteristics* scored more than 0.50, the midpoint on the relative index scale, implying that they are indeed very important to the consultants' performance on the projects. The most important attributes are: financial stability of client (credit-worthiness, current liabilities and current assets), feasibility of the

project (project priorities, feasibility study and site condition), past performance of client (cost overrun, quality achieved and time overrun), project characteristics (time for completion, type of project, cost of project and objectives/sub-objectives) and client's duties (project definition and formulation, planning and design, and project finance).

These findings indicate that:

1 Client performance is not a single attribute issue, it depends on a number of closely interrelated but very important attributes;

2 Financial stability, project feasibility and client duties are paramount but obviously not dominant client attributes. Their equal ranking index of 0.71 was only 0.01 > than the fourth attribute which is past performance;

3 Each main attribute consist of importance contributing sub-attributes. If the importance contributing sub-attributes of a main attribute changes its overall relative importance will also be affected.

CHAPTER 9

CHAPTER 9
A MODEL FOR ASSESSING THE RISK EXPOSURE OF PROJECT CONSULTANTS TO CONSTRUCTION CLIENTS

9.1 Introduction

The preceding chapter explained the relative importance of construction clients' attributes influencing project consultants' performance and hence their commercial viability. The attributes identified are of central importance to project consultants. The relative importance indices of both the main and sub-attributes calculated in chapter 8, form the basis of the model developed in this chapter.

9.2 Risk exposure

The risk of failure of construction companies, particularly consulting firms, has increased over the past ten years. Causes of business failures in the construction industry have been severally investigated (Argenti, 1976; Altman, 1983; Kangari, 1987, 1988). Some causes of business failure in the construction industry are: increased construction-activity competition leading to lower profit margins; management incompetence and lack of experience; insufficient sales as a consequence of decreased construction activity, and a drop in construction activity (low orders). Figure 9.1 shows the relative weights of the major causes of business failures identified by Dun and Bradstreet (1986). Each of these factors could be the subject of detailed investigation, but in this research we concentrate on the 'customers' for reasons already mentioned in preceding chapters.

In Dun and Bradstreet (1986) and many other investigations such as Gutman (1985), Maister (1985) and Foxhall (1975), the customer has been identified as one of the major causes of business failure. Recently, Nunn (1993), Leitch (1993) and Ray (1993) have highlighted this issue. Also, Odusote and Fellows (1992) found in their investigation that 'client related factors' such as client's ability to meet the cost of the work and the identity of the client are the most important factors to consider when contractors are making project selection decision. In fact, the influence of this source of failure in construction companies is widely recognised; to quote one prominent consultant:

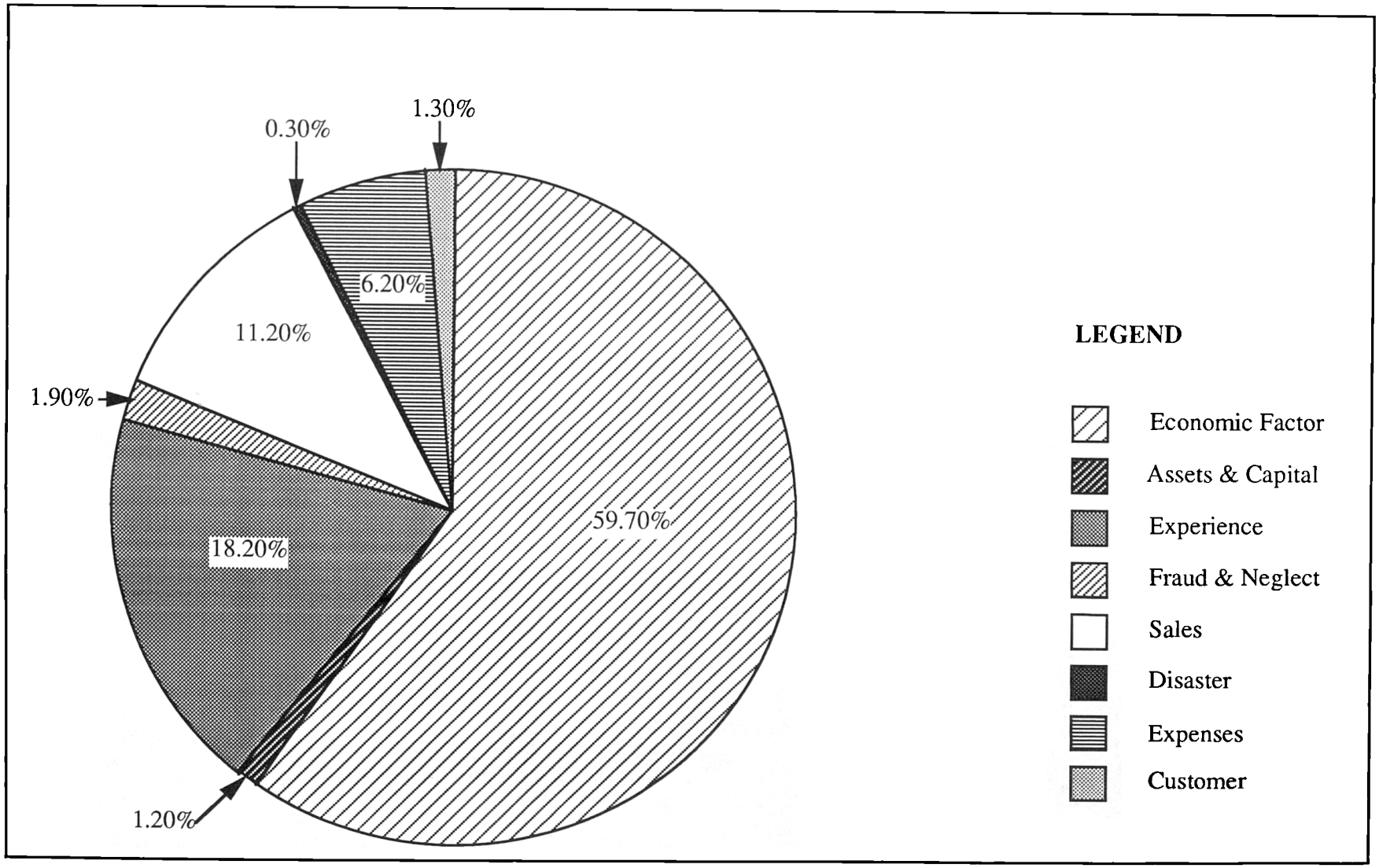

Figure 9.1 : Causes of Business Failure (Business Failure Record, 1986)

"There are quite a lot of cowboy clients around who try to get firms to do something for nothing and who are best avoided even if you are short of work at the time" (Golzen, 1984).

However, investigation into this cause of failure is deficient, even more so in the case of construction consulting firms. The potential risks that some client organisations pose to project consultants can lead to bankruptcy.

The responsibility of decision-makers to bid for a project or accept work from some clients has become more demanding. To aid consultant's decision making on whom to work for, or to appreciate the risk they face when embarking on projects, a client risk assessment procedure has become necessary. Such a procedure is described here. Results would serve as early warning signals to consulting firms when embarking on projects for their clients.

Construction projects involve highly qualitative and often subjective management factors; hence predicting the expected risk exposure of consultants to clients by means of an absolute evaluation value is difficult. The proposed risk evaluation procedure measures, by degrees, the relative importance of attributes in client organisations affecting the performance of project consultants. Apart from the assessment of risk, the procedure also enables the assessment of different attributes of client organisations. Hence the client's strength and weaknesses can easily be identified with this technique. Various reasons can be given for assessing the expected risk exposure of project consultants to clients. These may include:

(i) selecting which client to work for at peak periods when the consultant is operating at or near full capacity;
(ii) avoiding high risk clients;
(iii) to identify and evaluate potential business opportunities and ventures, e.g by evaluating the client the consultant may discover much more potential than the initial size of the job indicates; and
(iv) to measure the performance of different clients.

Since there are many factors at play in evaluating the overall performance of construction clients, an objective measure of the overall risk exposure based on clients attributes would be

advantageous. The procedure advocated in this thesis calls for assessing, through two levels, the ability of various attributes of client organisations affecting the performance of project consultants, and then sequentially integrating the assessed values into a single overall risk exposure index of the client.

The attributes are organised on two levels of abstraction as apparent in Table 9.1. Level 1 represent major areas of interest to consultants in the construction process. These areas are subdivided at level 2 into groups of mutually related attributes (sub-attributes). Each sub-attribute requires simple judgments by the decision-maker(s). The complete list of attributes used in assessing the risk exposure of consultants to clients discussed in the preceding chapters are summarised as in Table 9.1. The attributes were mainly extracted from literature and then tested for completion and comprehensibility in a pilot survey as discussed in chapter 4.

Each attribute / sub-attribute has been assigned an identification number for denotation in the data-entry format (described below). Two numerals are used to identify level 2 attributes, the first numeral denoting the major area of interest and the second denoting the numerical order of the sub - attribute. Level 1 attributes are identified by only one numeral, which denotes sequentially the major areas of interest.

Table 9.1 Attributes of clients' organisations

Identification number	Main attributes Level 1	Sub-attributes Level 2
1	**Project feasibility**	
1.1		Project priorities
1.2		Feasibility study
1.3		Site condition
1.4		Personnel appointment
2	**Clients' duties**	
2.1		Project finance
2.2		Project definition / formulation
2.3		Planning and design
2.4		Project implementation / management
2.5		Human factors
2.6		Schedule duration
2.7		Schedule urgency
2.8		Legal agreements
2.9		Contracting
2.10		Politics / social factors
3	**Financial stability**	
3.1		Credit worthiness
3.2		Currentratio :Current liabilities
3.3		:Current assets
4	**Past performance**	
4.1		Cost overrun
4.2		Time overrun
4.3		Quality achieved
4.4		Unsuccessful projects
4.5		Successful projects
5	**Project characteristics**	
5.1		Time for completion
5.2		Objectives / sub-objectives
5.3		Complexity
5.4		Type of project
5.5		Cost of project
5.6		Size of project
5.7		Location
6	**Organisational quality**	
6.1		Allocation of project responsibilities
6.2		Organisation of project team
6.3		Organisation of project interphase
7	**Past experience**	
7.1		Experience of personnel
7.2		Number of project completed
7.3		Involvement in construction activities
7.4		Types of projects
8	**Quality of management**	
8.1		Project management experience
8.2		Qualification of personnel
8.3		Project auditing
8.4		Quality assurance
9	**State of the economy**	
9.1		Economic boom
9.2		Economic recession
10	**Client characteristics**	
10.1		Communication channel
10.2		Type of client
10.3		Structure of client organisation
10.4		Size of client
10.5		Legal history

9.3 Judgments

A critical problem can arise if judgments are maintained only at one level and limited to a single attribute. Typically, judgments are base on multiple attributes which may even conflict (Einhorn and Hogarth, 1981). Hierarchical decision-making leading to a single objective is well established and has been used successfully in many areas in construction management research (Russell and Skibniewski, 1988; Seydel and Olson, 1990; Ahmad, 1990). Thus this was adopted for the proposed procedure and limited to two levels. In the procedure, project consultants judge each attribute on how it will affect their performance. The attributes are properly defined and the sample carefully selected to ensure that judgments are accurate. Project consultants are guided when making judgments. This is discussed later (chapter 10). It could be argued that project consultants show preferences for each attribute by making judgments following the guidance provided. Even so, some recently proposed multiple criteria decision support systems allow decision makers' preferences to be imprecise, and even intransitive (Dyer et. al. 1992).

9.4 Data - Entry

In assessing the expected risk exposure of project consultants to clients, decision-makers enter their judgment on data-entry formats, like those shown in Tables 9.2 and 9.3 for levels 2 and 1 respectively. The first entries are judgment of the relative importance of attributes within related groups at the respective levels. These values, called attributes weight constants ($c_{i,j}$), are entered at all two levels and are maintained throughout the entire assessment of alternative potential clients. However, it is expected that the attributes weight constants will be modified with the passage of time and change of location as consultants may deem necessary. Updated attribute weight constant will be necessary to reflect changes in the construction industry. The attributes weight constants are an indication of the relative importance of the attributes and are not to be influenced by or altered for specific clients. However, it should be appreciated that attribute weight constants are derived from research data; they could be adjusted to suit the specific circumstances of a consulting firm. The weighting assignments of the constants are calculated from the relative importance indices, with the sum totalling 100 in each of the mutually related group. The calculation was done using the following formula:

$$c_i = \frac{\text{Relative Importance Index for Sub-attribute}_i}{\sum_{n=1}^{n} \text{Relative Importance Index for Sub-attribute}_i} \times 100$$

where c_i = Weight constant for Sub-attribute$_i$

n = Number of Sub-attributes constituting a main attribute.

This could be demonstrated by an example. Consider 'project feasibility' whose sub-attributes are: project priorities, feasibility study, site conditions, and personnel appointment with relative indices of 0.79, 0.76, 0.68, and 0.61 respectively (Table 8.5, chapter 8), using above formula,

c_i for project priorities is *(0.79/0.79+0.76+0.68+0.61)x100 = 27.8 (28* approximately);
c_i for feasibility study is (0.76/0.79+0.76+0.68+0.61)x100 = 26.7 (27 approximately);
c_i for site condition is (0.68/0.79+0.76+0.68+0.61)x100 = 23.9 (24 approximately); and
c_i for personnel appointment is (0.61/0.79+0.76+0.68+0.61)x100 = 21.4 (21 approximately).

This calculation regime is repeated for the remaining sub-attributes to calculate their respective attribute weight constants.

Other input data, to be entered at level 2 only, are the quantitative assignments of values within the mutually related groups of attributes to indicate how effectively a specific attribute can potentially affect the performance of project consultants. These merit values (m_i) demand judgment by the decision-maker, who assigns a merit value for each attribute on a scale in which $m_i \leq 1.00$. An attribute assigned a merit value $m_i=1.00$ is judged to have a very high probability of being effectively satisfied by the client under assessment, whereas, the requirement of an attribute with a merit value of $m_i=0.03$ is not likely to be effectively met by the client. Because the merit values are ratings and not rankings several attributes may be assigned merit value $m_i=1.00$ within mutually related group of attributes for a particular client. Conversely, a client may not fully satisfy any attribute within a mutually related group, so that the highest merit value assigned is below 1.00 ($m_i<1.00$). Unlike the attribute weight

assignments ($c_{i,j}$), which are constant for all clients, the merit values are variables and will differ in the assessment of alternative potential clients.

A managing partner will provide the variable merit values based on his/her judgment of the commercial viability of the practice with respect to the client being evaluated bearing in mind the specific circumstances of the project. Guidance on how these values are elicited is provided and a scale from 0 to 100 is employed (see appendix C). This is because it seems that percentage carry more meaning than fractions between zero and one. Before entering the variable merit values into the model, they should, however, be converted to a scale of 0 to 1 by dividing by 100 to be consisted with the procedure.

In a computerised system, merit values can have a range of built-in values corresponding to linguistics variables as a guide to the decision-maker. The decision-maker still has to provide a value within the given range. Ahmad (1988), used this method to developed his expert system called BIDEX.

The decision-maker may not have access to information nor have intimate knowledge of all attributes within a client system. Often he/she will not be competent to evaluate particular attributes of some clients. In these cases, the attributes will obviously not be assigned a merit value. Some allowance is made for such omissions in data-entry by the computation of relative risk exposure indices as described in the next section. However, the overall risk exposure index will be weakened by data omissions, and the results somewhat distorted in favour of areas in which the assessor has most knowledge or expertise.

9.5 Determination of risk exposure indices

The first step to calculate the overall risk exposure index is to calculate the 'topical risk' exposure indices for each level 2 attribute. The topical risk exposure index (T_i) is the product of the weight constant for a given attribute and the corresponding variable merit value, expressed as follows:

$$T_i = c_i m_i$$

The next step is to compute the relative risk exposure indices for each of the mutually related groups of attributes in level 2. The relative risk exposure index is found by dividing the sum of the values of the topical risk exposure indices by the sum of the attribute weight constants within the corresponding attribute group. This computation is expressed by the formula:

$$E_j = \frac{\sum_{i=1}^{n} T_i}{\sum_{i=1}^{n} c_i} = \frac{\sum_{i=1}^{n} c_i m_i}{\sum_{i=1}^{n} c_i}$$

where:

E_j	=	Level 2 relative risk exposure index
T_i	=	Level 2 topical risk exposure index
c_i	=	Level 2 attribute weight constant
m_i	=	Level 2 attribute merit value

Because the structure of the attributes is not symmetrical, that is, number of constituent attributes within each related group is unequal, it is desirable that the relative risk exposure indices be computed throughout the structure. The relative risk exposure index ensures that excessive emphasis is not placed on merit values assigned to attributes within a group that has fewer constituent member than other attribute groups. Also, when the decision-maker is unable to judge some attributes, computation of the relative risk exposure indices would provide some allowance for data omission. It should be noted that where variable merit values are omitted in the rating of a client, the corresponding attribute weight constants are similarly omitted in the computation of the relative risk exposure index.

The relative risk exposure indices developed in level 2 (E_j) are then advanced to level 1 where they are multiplied by their corresponding attribute weight constants (c_j) to compute level 1 topical risk exposure indices (T_j). From the resultant topical risk exposure indices (T_j) developed in level 1, the overall risk exposure index (I), the main objective of the

methodology, is computed as shown by the following expression:

$$I = \frac{\sum_{j=1}^{10} T_j}{\sum_{j=1}^{10} c_j} = \frac{\sum_{j=1}^{10} c_j E_j}{\sum_{j=1}^{10} c_j}$$

where:

I	=	Overall risk exposure index for client being assessed
T_j	=	Level 1 topical risk exposure index
c_j	=	Level 1 attribute weight constant
E_j	=	Level 2 relative risk exposure index

Level 1 attribute weight constant (c_j) is calculated using the following formula:

$$c_j = \frac{\text{Overall Index for Main Attribute}_j}{\sum_{j=1}^{n} \text{Overall Index for Main Attribute}_j} \times 100$$

where n = Total number of main attributes, 10 in this case.

Summarising, the derivation of the overall risk exposure index (I) can be expressed as shown on the flow chart in Figure 9.2, depicting sequential dependency.

The overall risk exposure index (I) is multiplied by 100 to convert it to percentage terms. It is important to point out that the index is not intended as a means of assigning an absolute numerical value to every client, but rather as a means of comparing what risk project consultants face accepting to work for some clients by using Table 9.4. Table 9.4 provides a suggested management interpretation system for various ranges of the risk exposure index, I. Managers might use this table to evaluate their company's commercial viability in relation to the client/project being evaluated. Table 9.4 is to be adjusted from practice to practice based on cumulative experience of the assessor.

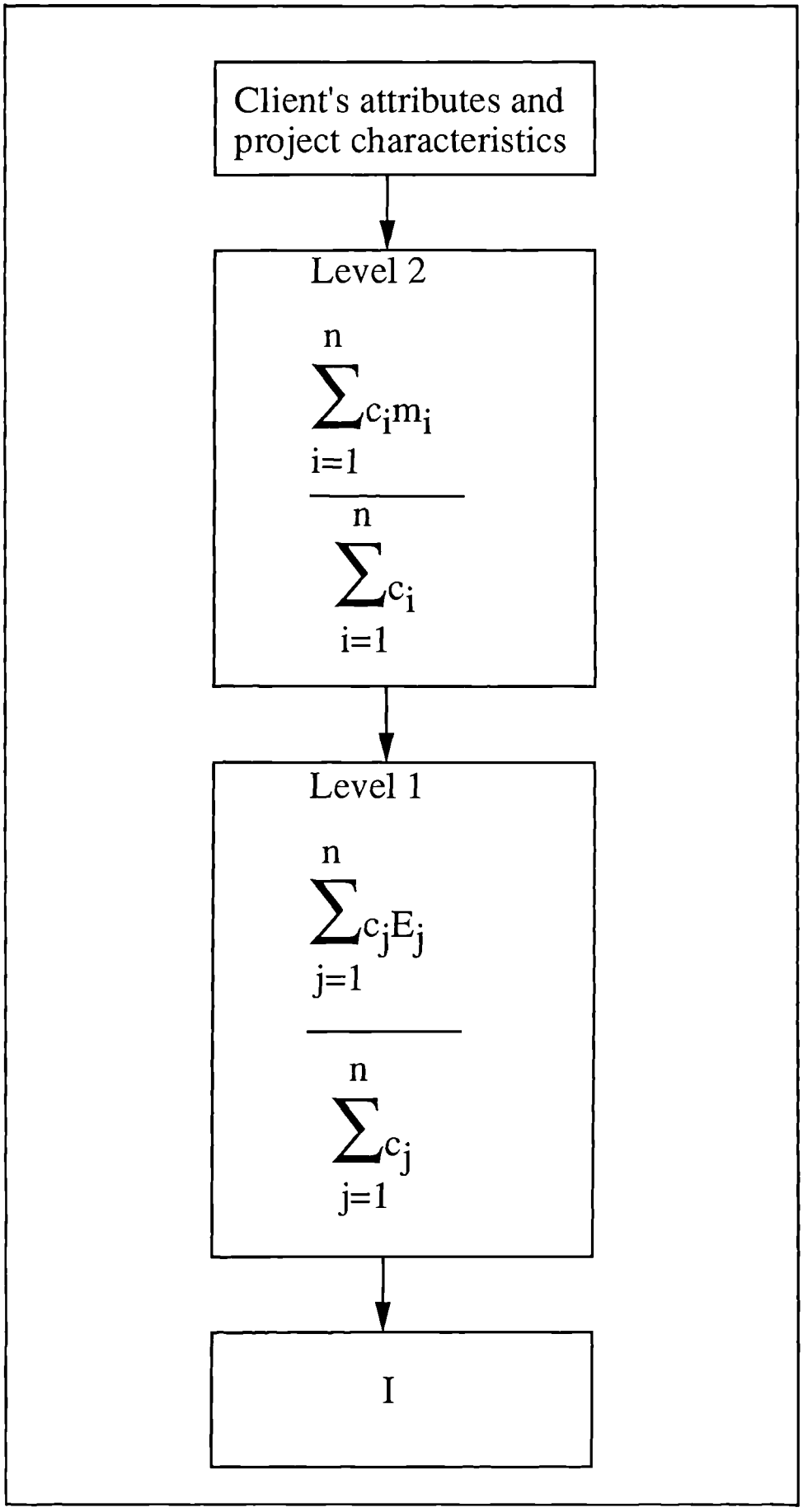

Figure 9.2 Summary of procedure

Table 9.2 Relative risk exposure at level 2 (Private client)

Level 2 Attributes identification	Attributes weight constants (C_i)	Variables merit values (M_i)	Topical risk exposure indices (T_i)	Level 2 relative risk exposure indices (E_j)
1.1	28	0.90	25.20	
1.2	27	0.95	25.65	
1.3	24	0.75	18.00	
1.4	21	0.80	16.80	
				0.857
2.1	13	1.00	13.00	
2.2	12	0.10	1.20	
2.3	11	0.30	3.30	
2.4	11	0.90	9.90	
2.5	10	0.05	0.05	
2.6	10	0.65	6.50	
2.7	10	0.55	5.50	
2.8	9	0.90	8.10	
2.9	7	0.40	2.80	
2.10	7	0.30	2.10	
				0.525
3.1	36	0.90	32.40	
3.2	34	0.80	27.20	
3.3	30	0.85	25.50	
				0.851
4.1	21	0.70	14.70	
4.2	21	0.80	16.80	
4.3	21	1.00	21.00	
4.4	19	0.40	7.60	
4.5	18	0.30	5.40	
				0.655
5.1	18	0.15	2.70	
5.2	17	0.05	0.85	
5.3	14	0.90	12.60	
5.4	14	0.65	9.10	
5.5	13	0.50	6.50	
5.6	13	0.60	7.80	
5.7	11	1.00	11.00	0.506
6.1	36	0.15	5.40	
6.2	33	1.00	33.00	
6.3	31	0.05	1.55	
				0.400
7.1	29	0.40	11.60	
7.2	24	0.90	21.60	
7.3	24	0.75	18.00	
7.4	23	0.50	11.50	
				0.627
8.1	27	0.90	24.30	
8.2	26	0.95	24.70	
8.3	25	0.55	13.75	
8.4	22	1.00	22.00	
				0.848
9.1	52	0.90	46.80	
9.2	48	0.65	31.20	
				0.780
10.1	29	0.90	26.10	
10.2	26	0.05	1.30	
10.3	22	1.00	22.00	
10.4	18	0.50	9.00	
10.5	5	0.20	1.00	
				0.594

Table 9.3 Relative risk exposure at level 1 (Private client)

Level 1 Attributes identification	Attributes weight constants (C_j)	Level 2 relative risk exposure indices (E_j)	Topical risk exposure indices (T_j)	Overall risk exposure index (I)
1	12	0.857	10.284	
2	11	0.525	5.775	
3	11	0.851	9.361	
4	11	0.655	7.205	
5	10	0.506	5.060	
6	10	0.400	4.000	
7	9	0.627	5.643	
8	9	0.848	7.632	
9	9	0.780	7.020	
10	8	0.594	4.752	
				0.667

9.6 Model implementation procedure

To further illustrate the procedure a private client risk index is assessed. The two levels derivation of the overall risk exposure index for this private client is shown in Tables 9.2 and 9.3. From the assessment procedure, the calculated overall risk exposure is 0.667 (Table 9.3), i.e 66.7% which fall in the range $60 < I \leq 80$ (Table 9.4). This particular client is quite satisfactory. The implementation procedure for the model can be streamlined in 7 steps as follows:

Step 1 Assign merit values for each of the client's attributes as shown in Table 9.2.

Step 2 Calculate the topical risk exposure indices by finding the product of attribute weight constant and corresponding variable merit values.

Step 3 Calculate level 2 relative risk exposure indices as described in the text.

Step 4 Advance level 2 relative risk exposure indices to level 1 (Table 9.3) and repeat Step 2 for level 1.

Step 5 From level 1 topical risk exposure indices calculate the overall risk exposure index (I) as described in the text.

Step 6 Convert I to percentage terms by multiplying by 100.

Step 7 Use Table 9.4 to forecast company's overall risk exposure to this particular client.

Table 9.4 Management course of action suggested by Overall Risk Exposure Index (Risk Classification Reference)

Risk exposure index (I) range (%)	Management action
$80 < I \leq 100$	Client pose no risk at all to consultant. Relationship with client should be encouraged by management. No adjustment action required. Good client, but continuous assessment of client circumstances should be maintained.
$60 < I \leq 80$	No danger is anticipated in the near future from this client. Client quite satisfactory. Monitor client slightly.
$40 < I \leq 60$	Client poses average risk to consultant. Management should watch client closely. Some aspects of consultant's project requirements may not be met.
$20 < I \leq 40$	Client is critical. Management should take action: threaten to refuse work from client or ask client to adjust. Working for such clients continuously, will in the long-run affect the commercial viability of the company.
$0 < I \leq 20$	Consultant should avoid such clients, even if they are desperate for work. Such clients will seriously affect commercial viability.

9.7 Summary

No universal quantitative model is available to aid project consultants to evaluate and assess their risk exposure emanating from different type and competency of client organisations. At the moment this is done in an ad-hoc manner and based on experience. This chapter presents a quantitative model based on the attributes of client organisations to assess the risk exposure of project consultants to clients and hence their chances of survival.

In addition to the calculated overall risk exposure index, this procedure can also provide a plot of the client profile using level 1 topical risk exposure indices. A profile for the private client used as an example is shown in Figure 9.3. It can be seen that the client is weakest in the following areas: project characteristics, organisational quality and client characteristics. Being aware of these, project consultant can pay particular attention to these attributes during the course of the project.

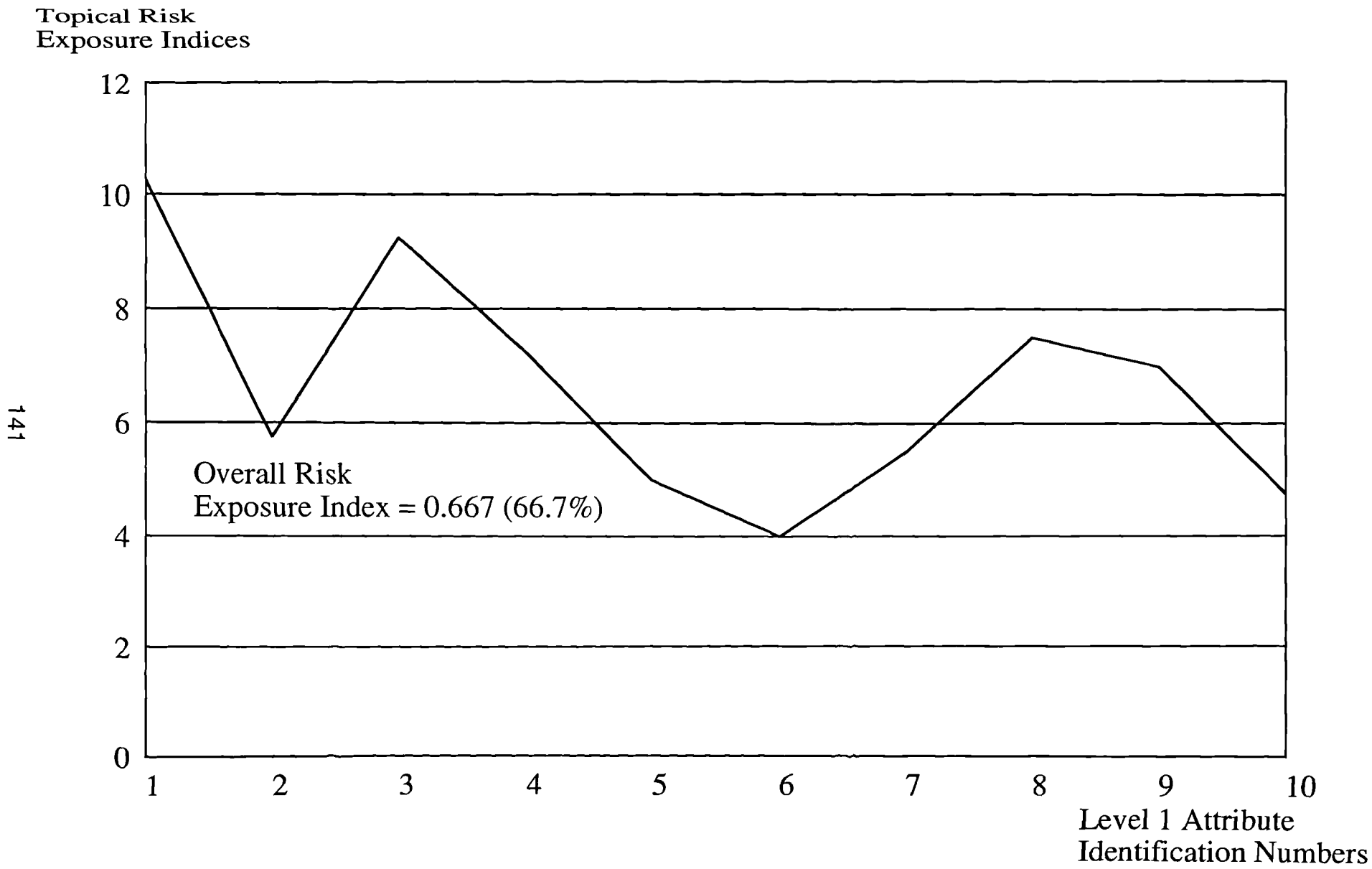

Figure 9.3 Client Profile

It should be recognised that the decision taken after the assessment procedure depends on the economic circumstances of the consulting firm. This is even more so as additivity of measurements within the various attributes levels and the linearity of the mathematical model could potentially present limitations for the methodology if the client's project undergoing assessment analysis is not viable.

CHAPTER 10

CHAPTER 10
EVALUATING CLIENTS ATTRIBUTES IMPACTING PROJECT CONSULTANTS' PERFORMANCE

10.1 Introduction

Clients' organisational and project management attributes influence project outcomes as discussed in the last three chapters. These attributes formed the basis of the model for evaluating client-generated risks developed in the preceding chapter. The main objective of this chapter is to present a series of independent evaluation approaches for arriving at variable merit values (m_i) for each attribute constituting input data for the model. As mentioned in the preceding chapter, each client attribute is designed to have a merit value ranging from '0' to '1' to measure how well the client satisfies the requirement of the attribute as judged by the project consultant.

Decision models do not depend solely on data. Individual judgment plays an important part. Given the right circumstances people can make precise, reliable and accurate judgments (Phillips, 1987). In the model described in the preceding chapter, attribute weight constant can be seen as representing utility attached to each attribute and merit values represent how 'good' the client/project is when measured on each of the attributes. The product of these two components gives the expected utility for an attribute which is synonymous to the topical risk exposure index described in the last chapter. The key point is that the theory of coherent preferences logically implies that judgments need to be made about only two quantities: merit values and utilities. While an event condition or an uncertain quantity is the subject of judgment, it is the merit values and utilities associated with them that are the expressions of judgment.

Modelling ensures that complex events (decisions) are broken down into simple ones with judgmental assessments made only about the simple events; in the model, decision is required only at level 2 (assessment of merit values for each sub-attribute). Even at this level decision is broken down further as we try to explain each sub-attribute. Throughout the course of any decision analysis, the focus is on the decision and the decision maker. It follows that a

decision analysis must be based on the decision maker's beliefs and preferences. The consultant's belief that his client will satisfy a particular attribute is shown on the curve in Figure 10.1, where the consultant's belief is transformed to merit values. For example, if the consultant believes that the chances of the client satisfying an attribute lies midway between 'no satisfaction' and 'perfect satisfaction' then a merit values of 0.50 is allocated (Fig. 10.1).

Data is required about the client to conduct the evaluation. Unlike the evaluation of construction companies by client organisations where extensive prequalification questionnaires are issued (Russell and Skibniewski, 1988; Holt et. al., 1994), evaluation of client organisations by construction consultants requires a different approach based solely on the consultants' working experience of different types of client organisations. Some attributes are only truly quantifiable in the mind of the consultant. Multiattribute analysis technique offers some hope; the model allows for data omission in situations where the consultant may not have access to information nor intimate knowledge of an attribute. In such instances, the result will be distorted in favour of areas in which the consultant has most knowledge or expertise. Independent evaluations of each attribute now follows and reference should be made to the guidelines provided in Appendix C which compliment the methodologies involved. It is also appreciated that some of these attributes may appear to overlap but they are, in fact, uniquely treated under different main attributes.

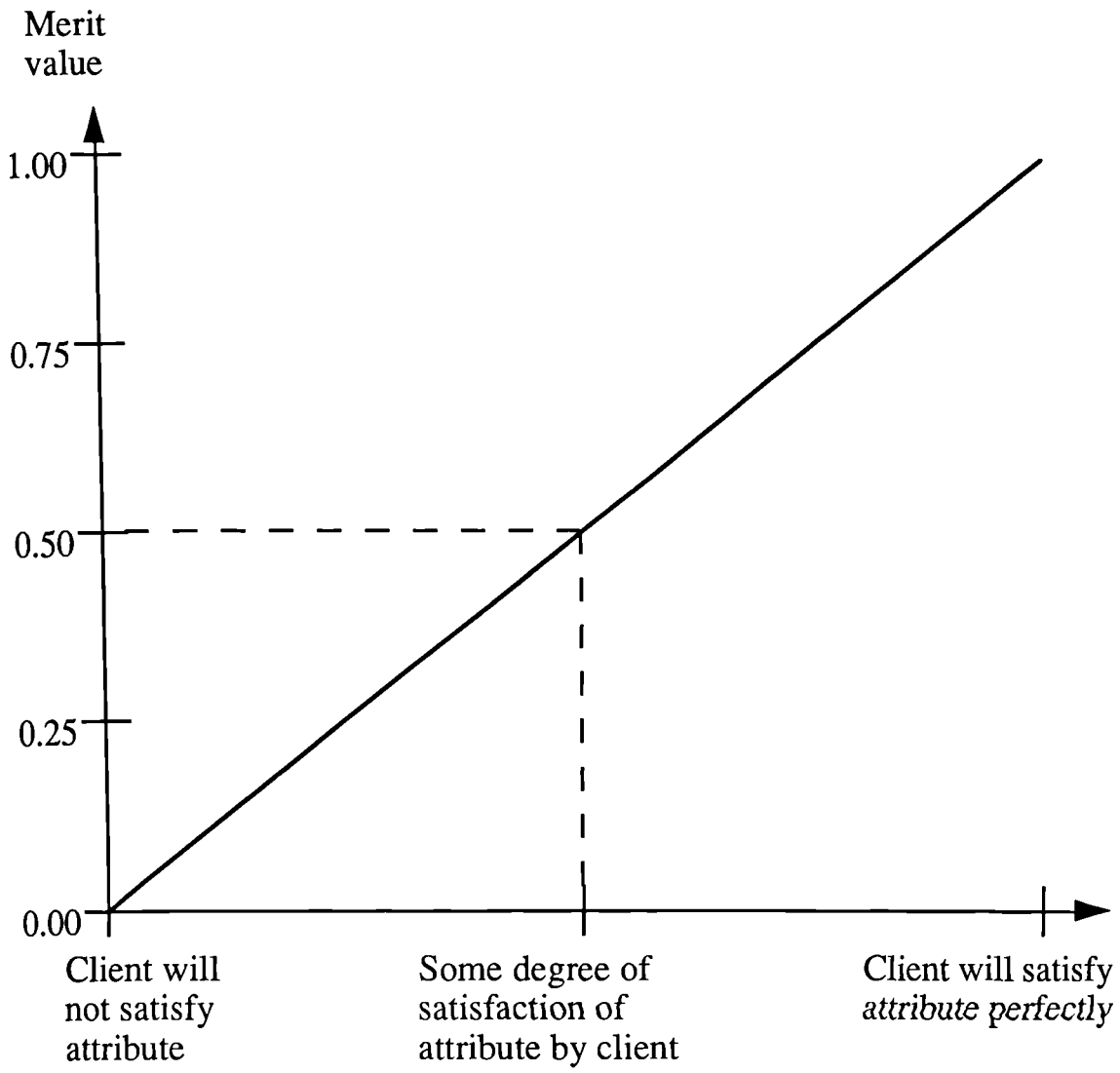

Figure 10.1 Curve for a typical client attribute

10.2 Evaluating the client attributes

10.2.1 Project Feasibility

This refers to the feasibility of the project in the broadest sense, that is, the identification of the prime purpose of the investment (e.g public usage, speculative development, personal need, profit seeking, etc.), including 'buildability'. The sub-attributes may be evaluated as follows:

Project priorities

It is the client's responsibility to ensure that project priorities are crystal clear to project participants particularly to the consultant at the initial stages of the project and if possible made to coincide with consultant's priorities which will encourage them to become personally involved in the project (Mohsini and Davidson, 1992). There would always be conflict of client project priorities and consultants *project priorities but clarity of project priorities can not* be compromised, particularly as focus on priorities provides a source of legitimacy for decisions, actions and serves as a basis for performance appraisal (Rowings et. al., 1987). An objective evaluation of *project priorities* is implicitly difficult, therefore, a subjective evaluation of the degree of effort the client employs to ensure that the priorities are made clear to the consultant could possibly be the best approach. Consultant could also assess the extent to which they identify with the project priorities as explained by the client (see *Appendix C*, S1.1).

Feasibility study

It is the client's primary responsibility to ensure that adequate desk, financial and field studies are undertaken. This is so because decisions taken immediately after this stage affect project realisation thereafter. As a matter of economy, clients want to limit amount spent in feasibility and project authorisation / budget studies ('Scope' 1986). More often than not, clients have no reason to spend additional funds in the feasibility study if the initial result looks favourable. Client cooperation in providing sufficient information and funding is paramount in the successful completion of the feasibility study. Some clients do not have engineering capability within their organisations to perform the feasibility study, because of this, consultant can objectively evaluate this attribute by: (1) assessing the extent of desk, financial and field studies

commissioned; (2) sufficiency of information provided during the study; and (3) sufficiency of funding provided. Because of market pressure some clients may want to commence the project immediately after the initial feasibility study has been completed. Decisions based solely on the initial feasibility study can almost double the cost and timescale for the project because of obvious reasons ('Scope' 1986). The client should spend some time and money to adequately carry out the feasibility study to avoid this potential pitfall. Where this is not the case, the image of the construction industry suffers. The project consultant should ensure that the client has carried out an adequate feasibility study (see Appendix C, S1.2).

Site conditions

This refers to the physical characteristics of the site particularly the sub-surface conditions which influence project performance (Peacock and Eurling, 1992). Poor site investigation can seriously impact project cost and duration. From the field study mentioned above the consultant should arrive at a reasonable conclusion about the physical characteristics of the site, establishing whether treatment is required for compaction, dewatering, etc. It is not uncommon for structures to be constructed on contaminated site due to inadequate site investigation with disastrous consequences to the client and the reputation of the consultant. The importance of adequate site investigation financially supported by the client can not be over emphasised. This attribute can be objectively evaluated by finding out if the client is prepared to pay for upgrading the ground conditions if required, if affirmative, a maximum score is awarded (see Appendix C, S1.3).

Personnel appointment

This refers to client personnel who have to work with the consultant during the project feasibility study most probably the client project manager. In the selection of this personnel the client organisation should consider the following: (1) the person and the position; and (2) the attributes which the person brings to the position and to the project (Hopper, 1990). It is important that the person should cooperate with the consultant and have the full authority to take decision on behalf of the client organisation because as the project unfolds, there are continuous problems to be solved and decision to made that require authority, power and status. Project consultant can objectively evaluate this attribute by directly assessing how cooperative the personnel are and assessing the adequacy of the power confer to them by the

client organisation with respect to decision making. Where the personnel shows high degree of cooperation and authority, maximum scores are awarded (see Appendix C, S1.4). No other qualification is necessary as *experience of personnel* and *qualifications of personnel* are evaluated elsewhere.

10.2.2 Duties of the client

This refers to the measures and actions that clients have to take to ensure that the project is successfully executed. The client must assume some responsibilities if he/she wants the project to be successful (Kometa et. al., 1995a). See chapter 6 as well; these responsibilities include:

Project finance

This is the sole responsibility of the client and refers to how he/she intends to finance or fund the project. Evidence of financial support will be helpful to the consultant. The project sponsors should be reliable and be interested in the project per se, not just in the *return* from the project, however, in a profit motivated culture nothing but the *return* will be sufficient. From close collaborations with the client's organisation project consultant can evaluate this attribute by deducing source(s) of funding and whether or not project sponsors fully support the project. The sponsors should also be reliable because this is crucial for morale during project execution and to maintain a healthy cash flow for the project consultant (see Appendix C, S2.1). Lapses occur in the control of real live project partly because the project sponsors were not appointed at the beginning of the project and partly because procedures were not sufficiently established at the time (Latham, 1994). The roles of project sponsors should not be overlooked by the consultants. An objective evaluation of their reliability is all that is required under this sub-attribute no other qualification is necessary as client financial stability in terms of *current assets*, *current liability* and *credit worthiness* is evaluated elsewhere.

Project definition / formulation

Preparation of the project definition / formulation is primarily the responsibility of the client and involves dialogue between the consultant and the client to develop the design brief which is a carefully prepared statement of the client's requirements; undertaken after the project priorities and feasibility have been established. It is used as a basis for budget estimating and bulk

materials quantities ('Scope' 1986). Good project definition / formulation inevitably leads to a successful execution (Kelly et al. 1992; Newman et al. 1981) as it increases the accuracy of budget estimates and reduces the chances of change orders. Thus client organisation should allow enough time for briefing; provide sufficient information; establish communication channels; etc. In short, the project should be well defined before the start of detailed engineering and design. Consultants can evaluate this attribute by looking for signals that the client has not spent too little time defining the project and the adequacy of information provided. Client should avoid decision delays (see Appendix C, S2.2).

Planning and design

This refers to in-house project planning and design that some client organisations undertake before approaching a consultant or contractor (Tucker and Scarlett, 1986) which translate objectives and priorities into desired end results by defining resources required, methods, actions and establishing a framework for monitoring and controlling progress. It should be pointed out that not all clients undertake this exercise. This is particularly true in the case of 'inexperienced' or new clients. However, all clients are expected to have a comprehensive project-specific execution plan specifying the project design requirements, mandatory technical features, layout criteria, maintenance and operational requirements which may give the consultant a firmer basis at the start of his/her work. This ensure that the client has considered most of the major aspects of the project before involving the consultant. The client should ensure that formal buildability / constructability programmes are made an integral part of the project planning incorporating construction inputs (CII, 1990). An experienced corporate client with in-house capacity would implement these issues in which case a maximum score is awarded (see Appendix C, S2.3).

Project implementation / management

This refers to the client's requirements with respect to the actual realisation of the project and includes variables such as: procurement route desired (e.g traditional method, or design & build); type of contract (e.g lump sum contract, cost & fee, etc.); form of contract (e.g JCT, ACA, ICE, NEC, etc.); periodic meetings (e.g how regular, people to attend, etc.); period of interim payment; and reports (e.g regular update of progress, etc.). All these variables

influence the performance of the project. This attribute can be evaluated by considering whether: (1) the procurement route, (2) contract type, (3) contract form and (4) regular update of progress; selected are suitable for the project (see Appendix C, S2.4). As an example, the client might insist on procurement route, contract type and form that does not necessarily suit the project in which case a minimum score should be awarded. Consider this extract from Latham (1994) *"The client whose commercial requirements demand an early start on site and sequential design during the course of the work should choose a procurement route which will accommodate those wishes in a flexible manner and which avoids adversarial attitudes. Construction management or management contracting will be most appropriate. A lump sum contract as JCT 80 or Design & Build route would be a recipe for disaster if the work is intended to progress on site while design is still proceeding."* The client role in the project implementation / management can not be over emphasised.

Human factors

Although one of the most neglected area in the construction industry (Hopper, 1990) the importance of human factor element in project implementation can not be disputed. Senior management support for the project, adequate and experienced construction team and competency of client personnel are all human factors which are difficult to evaluate objectively because they involve the behaviour of individuals; subjective evaluation in the tradition of the social sciences seem to be the only way (see Appendix C, S2.5). The majority of project failure are found to be as a consequence of managerial or human behavioural factors (Baker, 1988), as such, the influence of human factors particularly within the client organisation should be carefully evaluated.

Schedule duration

This refers to the display of project time allocation for each activity (Hartley, 1993). This is important to all the parties involved in the project as prolongation can impact major changes in output prices, regulation, technical development etc. It is important for the consultant to finish a job on time as this is good for image building and may even lead to repeat business. All the parties to the project particularly the client should fully support the schedule duration. The client should meet time commitment, for instance, providing information when necessary or paying invoices when due. Adherence to project schedule is crucial for successful execution.

This attribute can be evaluated by establishing the client support for the schedule duration of the project (Appendix C, S2.6) by noting how readily and quickly he/she provide information when needed. The project schedule is only as good as the project participants' commitment to making it work, particularly the client. Maximum benefits are attained from the project schedule only through its continual use by the project participants.

Schedule urgency

This refers to client instilling the required degree of urgency in the project personnel i.e. avoid rushing by all means but on the other hand discouraging delays. In other words, instil the require philosophy of schedule consciousness in all project participants (Hartley, 1993). The client organisation in general and the client project group (CPG) in particular should show the required degree of urgency in the project. For instance, decisions should be taken as and when necessary as clients who are slow in decision making will negatively impact on the project performance by slowing down the progress of the consultant. This attribute can not be evaluated objectively, therefore, subjective evaluation is employed by noting how effectively client personnel react to the scheduling effort.

Legal agreements

This refers to the client being 'committed' to the contract rather than getting involved with disputes. Disputes often lead to litigation which become time consuming and expensive. With this in mind, the client should respect period of interim payments, arrange regular meeting(s) on site, and generally respect the contract conditions. This attribute can be evaluated by considering if client generally respect contract conditions by talking to other consultants or contractors who have had previous contact with the client in question (see Appendix C, S2.8). Above all, construction client should avoid changing his/her mind, but if absolutely necessary allowance in terms of time and cost should be made, i.e the client should understand the consequence of this decision. This is the source of frustration to most consultants and contractors as one nicely put it *"Sometimes the client is to blame. He changes his mind and wants to pay no extra money. The contractor may be a little annoyed"* (Building, 1992).

Contracting

This refers to detailed issues between the parties to the contract which include contract document, express agreements, allocation of risks etc. and was identified by consultants as an important client's responsibility in the construction process (chapter 6). To evaluate this attribute, the following should be addressed: (1) suitability of contract document to the special circumstances of the project, (2) allocation of performance risk, (3) project safety management programmes etc. (see Appendix C, S2.9).

Politics / social factors

This refers to government fiscal/monetary policies, safety, codes & regulations and community factors. The client should have a contingency plan in case of political instability or strikes. Strikes and political instability disrupt the progress of work and affect morale. This attribute can be evaluated subjectively by establishing the existence of such contingency plans (Appendix C, S2.10). Political , social and cultural influences are more common on international projects as demonstrated by Baker (1988).

10.2.3 Financial Stability

This refers to the overall financial stability of the client organisation under consideration which can be assessed through her credit worthiness, current liabilities, and current assets. From these factors we can calculate the *gearing* and *current ratio* of the organisation. Let us look at each one in turn.

Credit-worthiness

This refers to the borrowing power of the organisation which is limited by its articles of association and existing borrowing. There are a variety of methods for measuring a company's overall borrowing position. For instance, gearing, or debt/equity ratio (Holmes and Sudgen, 1990).

$$\text{Gearing } \% = \frac{\text{Loan capital + Bank borrowings and others}}{\text{Capital employed}} \times \frac{100}{1}$$

As an illustration, assume the following figures have been extracted from a corporate client's accounts (annual report): loan capital, £1,024,000; bank overdrafts and others, £510,000; ordinary shares, £764500; reserves, £1,021,500. Sum of these figures equals capital employed. Using the formula above:

Gearing = (1024000 + 510000) / (1024000 + 510000 + 7645000 + 1021000) = 46.2%

That is, the client has a borrowing position of 46.2% which is regarded as high, a 'highly' geared company is one which relies on borrowings for a significant proportion of its capital and vice versa for a 'lowly' geared company (Holmes and Sudgen, 1990). A 'lowly' geared company is less prone to external influence from funding houses.

Current liabilities

These are creditors to the company and refers to liabilities that the company expects to have to meet within twelve months. In modern accounting practice the current liabilities are normally shown below the current assets on the assets side of the balance sheet and often an essential part of the annual report.

Current assets

These are cash and other liquid assets that the company expects to turn into cash, for instance stock. This value can easily be extracted from company's balance sheet. From both current liabilities and current assets calculate the current ratio:

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

The current ratio is a broad indicator of a company's short-term financial position (Holmes and Sudgen, 1990). A ratio of more than 1.00 indicates a surplus of current assets over current liabilities. A ratio of 1:1.5 being considered as prudent for construction companies (Abidali, 1990). In other words the company will be able to pay all its current liabilities were such to be 'called in' at short notice. A ratio of less than 1.00 indicates more current liabilities over current assets. In other words, the organisation would not be able to pay all its current liabilities in the short term, were all its current assets converted into cash. From the calculated ratio provide a merit value (see Appendix C, S3.2/3.3). A current ratio of more than one

should attract a high merit value and vice versa. More information about client financial stability can be obtained from bank references, trade creditors references and company turnover history. Alternatively, a 'cast iron' evaluation of client financial stability is for client to deposit contract sum in a trust fund as suggested by Latham (1994); this is being implemented by a developer backed by Barclays Bank (Building, 1994). In this situation, the client should be awarded maximum score for financial stability.

10.2.4 Past Performance

Where the client is 'new' to the consultant this attribute can be evaluated by reference to other consultant who have previously worked for the client. If the client is not new to the consultant assessing past performance from prior experience is encouraged. This assessment should be reliable because the information is from an internal source. If the client is new to the construction industry, i.e has not commissioned any project before, then all the sub-attributes below should score zero. It is also appreciated that while the company may be new, some of it's owners may not be, the consultant should bear this in mind.

Cost performance

The cost performance of a client depends on sufficiency of information provided, time required to procure more information if needed, and extent of tasks' interdependence within the client project group. All these are necessary to prevent the client from changing his/her mind later on in the project and will help prevent cost overrun(s) (Mohsini & Davidson, 1992). Since clients have substantial influence on the overall cost of a project, this attribute should be given serious consideration by project consultants in a manner similar to consideration of contractors' past performance when deciding which construction firms should be invited to bid for projects (Russell and Skibniewski, 1988; Holt et. al., 1994). Evaluation may be by asking previous consultant(s) if their contract overran on cost and how much of this could be directly linked to the client?(see Appendix C, S4.1).

Time performance

This depends on client participation and sufficiency of information provided. The influence of the client on project completion time could be most critical especially on fast projects; and is of

much concern to contractors and consultants on such projects as a simple delay could result in exaggerated delays on the total project period. Consultants could evaluate this by checking previous time overruns and how much of it could be attributed to the client. See Appendix C, S4.2.

Quality performance

Depends on the extent of specialisation, sufficiency of information provided and extent of tasks' interdependence (Mohsini & Davidson, 1992). It is important for consultants and contractors to assess the client contribution in the achievement of the desired quality on the project as it has been found that clients who exercise close involvement seem to be the clients who are most satisfied with their project quality (Thrush et. al. 1987; Bubshait, 1994). Evaluating how much the client did or did not influence the quality achieved on the project could be one way of assessing this sub-attribute. (see Appendix C, S4.3).

Unsuccessful /Successful projects

The past performance of the client can also be measured by assessing the proportion of total projects unsuccessfully executed by the client. It is appreciated that success or failure is difficult to define (Morris and Hough, 1986; Hayfield, 1985). This will depend on the degree of satisfaction of the client. This in turn relies on how closely the project meets the client's requirements. This attribute is evaluated by finding the number of unsuccessful projects as a proportion of all projects completed in say the last five years (see Appendix C, S4.4/4.5).

10.2.5 Project characteristics

This refers to the specific features of the project which include time available for completion, objectives / sub-objectives, complexity, type, cost, size and location which invariably affects the overall performance on the project.

Time available for completion

The time available for the project has a crucial bearing upon completion depending on the nature of the job; availability of labour, plant, and material; client ability to give the ultimate 'go ahead' ; etc. A third of all projects are completed behind schedule because of poor planning (CII, 1990). Consultant can evaluate this attribute by noting if the time allowed for completion

is suitable bearing in mind the availability of plant, labour and material (see Appendix C, S5.1). Clients who want to meet certain dead lines because of market pressure and therefore allow for unrealistic project completion time should attract minimum score when evaluated.

Objectives / sub-objectives

Guide numerous decisions throughout the project's life in the owner's, designer's and contractor's organisations (Rowings et. al., 1987), and owners are the primary influence in the process of setting and communicating objectives (Sievert, 1986). Since the relationship between clearer project objectives understood by all and project performance can not be disputed it should be one of the primary responsibilities of the client organisation that the project objectives are made clear especially to the consultants. The following measures are known to impact on the clarity of project objectives: predesign/preconstruction meetings, project objectives letters, executive level reviews, weekly progress meetings, etc.(Rowings et. al., 1987). This attribute can be evaluated by establishing the degree to which the client has implemented these measures (see Appendix C, S5.2).

Complexity

This refers to the complexity of the project both in terms of design and construction and also involves the construction methodology envisaged. A buildability assessment of the proposed project could be the best way to evaluate this attribute (see Appendix C, S5.3). A standard family house would be a routine design and construction to most consultants and contractors respectively; but not petro-chemical complexes. Thus the consultant has to weigh the complexity of the project with the resources and technology available to him and charge a fee accordingly.

Type of project

This refers to the particular category of the project such as single-family houses, multifamily houses, roads and bridges, nonresidential buildings (schools, hospitals, shop, offices, etc.), water supply, industrial plant, civil projects airports, etc. The client's previous design and construction experience of similar project type is important to consultants. The main question in evaluating this attribute is whether or not the client has adequate experience in this type of

project. See Appendix C, S5.4. A client deviating from his traditional project type should be treated with caution ('Hot', 1985).

Cost of project

This refers to the in-house cost estimate for the project and the consultant's fee in relation to the contract sum. Guidance for arriving at the consultant's fee for project cost in the range of £20,000 to £5m is provided by RIBA(1990). Where the total construction cost is less than £20,000 or more than £5m, the client and consultant should agree an appropriate fee basis at the time of appointment. Since satisfaction with fee level will impact on project consultant's performance it should be carefully evaluated by considering: (1) whether the clients' in-house estimate of the contract sum is realistic for the project, and (2) appropriateness of the percentage of consultant's fee in relation to the contract sum (see Appendix C, S5.5). Clients who have commissioned similar project will be able to furnish a more realistic in-house estimate and should be awarded a maximum score.

Size of project

This is measured in terms of contract cost estimate in comparison to the typical size of projects undertaken by the client (see Appendix C, S5.6). If the size of the project is far bigger than what the client would normally undertake, score zero. Consultants should also assess the effect of the size of the project on their practice, i.e consider whether the project is too big or small for the firm (Leung, 1994).

Location

This refers to the location of the consultant in relation to the project site. It is the client primary responsibility to ensure that the consultant is familiar with the project location. Familiarity with the area would improve client confidence because of consultants' knowledge of project location in terms of plant, labour and material availability. Evaluate this attribute by checking the proximity of consultants selected for the project by the client (see Appendix C, S5.7). The consultant should also consider the effect on overhead of project location in terms of distance from controlling office.

10.2.6 Organisational Quality

This refers to the degree of competence the client exercises in the project realisation process and encompasses the allocation of project responsibilities, the organisation of the project team and the coordination of project interphase.

Allocation of project responsibilities

It is the client's responsibility to ensure that clear lines of authority, communication and responsibilities have been established. It is important that parties within the client project group understand their respective responsibilities, nothing should be ambiguous. This would obviously affect project consultant's performance on the project particularly if his/her scope of responsibility is not made clear. This attribute can be evaluated by considering the degree of clarity of lines of authority and responsibilities of all parties to the project (see Appendix C, S6.1). Whatever the procurement route chosen by clients, the need to integrate and clarify design responsibilities remains (Latham, 1994).

Organisation of project team

This is primarily the client's responsibility and refers to the assembly of the client project group (CPG) as pointed out by CIOB (1980). That is, the client should set up a group or committee to be in charge of the project. The existence of such a group is very important to the project success, which should have the full authority to carry out the project. From project consultant's relationship with the client organisation he/she should be able to ascertain the existence of such group, hence evaluate the attribute (see Appendix C, S6.2). The importance of project team building can not be over stressed (Latham, 1994; CII, 1993).

Coordination of project interphase

Again, this is the client's sole responsibility and refers to the coordination of the various parts of the project. The client organisation should be in charge of this process. In the traditional building process, design is divorced from construction (the converse is true with 'package deals'); the client should ensure a smooth transition from design to construction. Various parties to the project (consultants, contractors, etc.) may have conflicting needs to that of the client (Cherns and Bryant, 1984). Effort should be made to ensure that the needs of the client coincide with those of the other parties to the project. This will give a common interest to all

parties concerned, hence coordination will be made more easier. Project consultant can evaluate this attribute by finding out if the client has a plan on how to coordinate the whole project (see Appendix C, S6.3). Assessment could also be achieved in terms of procurement route / contractual arrangement particularly as package deals allow for smooth transition from design to construction.

10.2.7 Past Experience

The past experience of the client organisation is very important in evaluating their ability to work with construction companies. This depends upon the experience of the personnel, the number of projects completed, the client's general involvement in construction matters. A client organisation with considerable past experience is better placed to achieve a successful project than a client with no past experience.

Experience of personnel

The client organisation is only as good as the people that make it up (Martin and Grover, 1988). This is a function of their general experience in construction matters and their specific experience or expertise in the project at hand. This attribute can be evaluated from the experience or expertise of the personnel (see Appendix C, S7.1). Other consultants with previous experience of the client may help achieve this.

Number of projects completed

Walker (1989), and Masterman (1992) defined experienced clients as those who build more than once every five years. If they have been involved with many projects in the past, the chances are that the client organisation will appreciate how the construction industry operates and they would have developed a good approach to suit their given particular circumstances or needs. Project consultants can evaluate this attribute by finding out the number of projects completed within the last five years (see Appendix C, S7.2).

Involvement in construction activities

This refers to the interest that the client organisation shows in the construction industry. For instance, appreciation of latest construction technology, or simply attending construction seminars to learn more about the industry. This interest is likely to be high if the organisation

is a regular construction customer, thus making them more involved with the industry. Such clients are expected to foster their own interest by joining the Construction Clients' Forum as suggested by Latham (1994) or other client body such as British Property Federation (BPF), Construction Industry Employers Council (CIEC), etc. This attribute can be objectively evaluated by noting whether client is a member to any of these institutions, in which case a maximum score should be awarded (see Appendix C, S7.3).

10.2.8 Quality of Management

This may be referred to as 'management accountability' relating to the efficiency with which resources are used, and 'programme accountability' relating to the effectiveness of programme operations in accomplishing objectives (Livingstone & Gunn, 1974). All these are treated with respect to the project at hand. Evaluating the 'quality of management' within an organisation in any total sense is very difficult, its also not easy to define. To undertake this evaluation, we have to know the organisational framework and the assignments of responsibility and authority. We need to know the mechanisms that the client organisation has established to ensure that the programme or activity is carried out as intended and to inform itself as to what is being accomplished. In order to achieve this, the following should be assessed.

Project management experience

It is important for senior management in client organisation to have been involved with the management of similar type of construction before. Top management should have the essential information to exercise supervision, control and ascertain direction of trends (Corrie, 1991). Project consultant with no previous past experience with client, can still assess client 'project management experience' by talking to other consultants. If the client is new to the industry, the intention of the client organisation with respect to the management of the project can be achieved by collaboration. For instance, how does the client intend to manage the project to ensure that the client's requirements are met? This attribute can be evaluated by establishing whether: (1) the client organisation had been involved with project management in the past, and (2) the client had managed similar type of construction before (see Appendix C, S8.1).

Qualifications of personnel

This refers to both academic and professional qualifications of client personnel in charge of the

project (membership of professional institute e.g CIOB, ICE). Qualifications should be backed with practical experience. Age also influences the performance of client key personnel with optimum performers found to be between 30 - 40 years old. All these factors interact to produce a suitable personnel for the job (Mustapha, 1990; Hopper, 1990). For evaluation of this attribute see Appendix C, S8.2.

Project auditing

The client organisation should have an adequate internal review or audit facilities to monitor the project operations, identify shortfalls, and assure integrity. This will ensure that corporate policy and excellence is being achieved particularly if it involves investment in capital projects (Hakes, 1994). Thus, this attribute can be evaluated depending on the extent to which these measures are implemented within the client organisation (Appendix C, S8.3).

Quality assurance

Quality assurance is a management system which increases confidence that a material, product, or service will conform to specified requirements (CIRIA, 1988). Client organisation should encouraged quality assurance procedures. Is the client BS 5750 or ISO 9000 accredited? Evaluate them on whether or not they have achieved an independent accreditation of their organisational procedure through BS 5750 (see Appendix C, S8.4).

10.2.9 Current Market Conditions

This refers to the prevailing market conditions of the construction industry in the economy. At times demand for construction products may be low while at times it is high. The Building Magazine gives economic pointers and indices for assessment of economic demand. Some client organisations may take advantage of these external factor by attempting to invest in a building during recession in order to achieve lower costs because they are aware that consultants or the construction industry as a whole is desperate for work, evidenced by the submission of tighter bids during recession

Economic boom

This refers to the period of high demand in construction products. Project consultants need to

know how clients react during economic boom. Are they more cooperative or otherwise? How does this affect project consultant's performance on the project?

Economic recession

This refers to periods of low demand for construction products in the economy. During this time, some construction companies might be desperate for work. Do clients take advantage of the situation? For instance, they might attempt to influence the consultant's pricing policy because they are short of work (Golzen, 1984).

10.2.10 Client Characteristics

These are features in the client organisation which include type of client, structure of client organisation, and the client legal history. Including communication channels and size of client which have already been mentioned in previous sections. These features influence the successful execution of construction projects.

Type of client

This refers to either public or private sector clients, developers or any other category (e.g naive / expert client) as deemed necessary by consultants (Hillebrandt, 1974). The private owner who is a sole individual will be more easy to deal with unlike a complex client with many departments having conflicting needs. Thus this have a bearing on consultant's operational procedure and commercial viability; this is even more so in the case of overseas clients. However, it is generally perceived that public sector clients pose less risk in terms of payment than private sector clients. Consultants should be able to assess relationship with different types of clients and hence their performance on projects from past records. This attribute can be evaluated based on consultant's experience with previous similar type of clients (see Appendix C, S10.1).

Structure of client organisation

Structure of client organisation could be centralised, decentralised or both. The length of time taken to provide a simple information at the early stages of the project can tell the consultant more about the structure of the organisation. Complex and hierarchical organisations take long

to provide information compared to simple ones. It is not uncommon to find client personnel in consultant's office only to collect information and send to the home office for review and decisions. The structure of the client organisation can be diagnosed with the aid of the Linear Responsibility Chart (LRC) (Laufer, 1989). For the evaluation of this attribute see Appendix C, S10.2.

Legal history

The litigation history of a client can be assessed by analysing cases published by the official referee court. The consultant should be very discreet and note that there could have been out of court settlements. From project consultant's findings, assign a merit value for 'legal history'. Take particular note if the client was the defendant or plaintiff and the number of litigation involving the client within the last five years (Appendix C, S10.3).

10.3 Summary

The chapter presented rationalised techniques for evaluating clients' attributes ultimately identified by project consultants as impacting their performance and hence commercial viability. Results from these independent evaluation constitute input data for the model; clients strength and weaknesses with respect to each attribute can then be ascertained and corrective measures taken. It is appreciated that most of the attributes are evaluated subjectively based on the past experience of project consultants but attempt has been made to rationalise and systematise client evaluation over a wide range of variables and project specific characteristics. The attributes are many because they must necessarily involve as many important factors of judgment as possible. Omissions will result in shortcomings in the end objective; (overall risk exposure index). Bearing this in mind, it should be appreciated that the assessment methodology would need to be continuously refined as construction client evaluation is only but a new research field with disparate measures being combined to evaluate the client. Consultants would appreciate the risks they face working for clients as the model will operate as an early warning signal.

CHAPTER 11

CHAPTER 11
APPLICATION OF THE CLIENT EVALUATION MODEL

11.1 Introduction

A model for evaluating client-generated risks to project consultants based on client attributes was presented in chapter 9; the preceding chapter presented rationalised elicitation approaches to methods of data acquisition required by the model. Results from independent evaluation of clients' attributes constitute input data for the model. In this chapter the applicability of the model to construction projects is tested and other uses of the model discussed.

The insolvency of construction clients have driven many construction companies to the edge of bankruptcy. Individual construction companies should have their own strategy to safe guard commercial viability. Such a strategy underpinned the development of the model described in this thesis. The model provides an alternative approach to the current method of client evaluation, which is highly subjective and limited to client financial analysis only, with little extra effort on the part of the practitioner for a more systematic approach. The model is computationally economical involving project decision (which the practitioner will nevertheless make) and project performance. The objective of this chapter is to present the application of the model. To achieve this, the basis of the testing the applicability of the model using project outcomes, is first presented. The use of project outcomes to measure project performance is considered to be the 'state-of-the-art' by practitioners (Mohsini, 1989; Mohsini and Davidson, 1992; Naoum, 1994).

11.2 The application procedure

A model such as the one described in this thesis can either be applied retrospectively on completed projects with definitive project outcomes or concurrently against outcomes as they occur on live projects. While concurrent use of the model would be more valuable and scientifically interesting allowing for empirical study of the dynamism of the model, it would take a longer time and could be very expensive. It is therefore often the case that such a model as this is tested for applicability restropectively using existing or historic data; this model was applied restropectively using definitive project outcomes. Project outcomes in terms of time,

cost, quality and fees on past projects were solicited from construction consulting firms and processed to arrive at an Aggregate Project Outcome (APO), described in the next section. The model was then explained and presented to the same consulting firms and were subsequently asked to evaluate the attributes of clients when the projects started. Their responses were processed to arrive at a risk exposure index (I). The I's and APO's from 29 projects were then compared.

It should be emphasised at this juncture that this thesis only sought to develop a framework capable of systematising construction client evaluation and its applicability only tested on this basis. While it is capable of being used as a predictive tool its validity as a coherent framework must first be confirmed. Outcomes from completed projects seem the best way of confirming this.

11.3 Project outcomes

Project outcomes are directly influenced by construction clients (CII, 1990), particularly with respect to their needs and responsibilities in the construction process (chapter 6). While it is recognised that the client is not the only determinant of project outcome, his/her influence has been found to be significant (Bubshait, 1994; Weng, 1990). Project outcomes with respect to client performance can be gauged in terms of time, cost, quality and fees. Let us briefly examine these performance indicators in turn.

11.3.1 Time

Records show that about a third of all construction projects finish late (CII, 1990), resulting from poor planning, lack of experience, unforeseen circumstances, owner change of mind or indecisiveness, which can tarnish the image of consulting / contracting firms even when not responsible, thereby impacting on their future chances with potential owners and also tying-up resources in the current project. This is even more so as *past performance* with respect to *time overruns* is one of the prequalification criteria used by clients in the selection of contractors and consultants (Russell and Skibniewski, 1988; Holt et. al., 1994). The risk of time overrun can be ascertained from the percentage difference between the planned contract period and the actual period to practical completion; average performance within 10% of

contract period (NEDO, 1983) can be deemed satisfactory, scaled as in Figure 11.1.

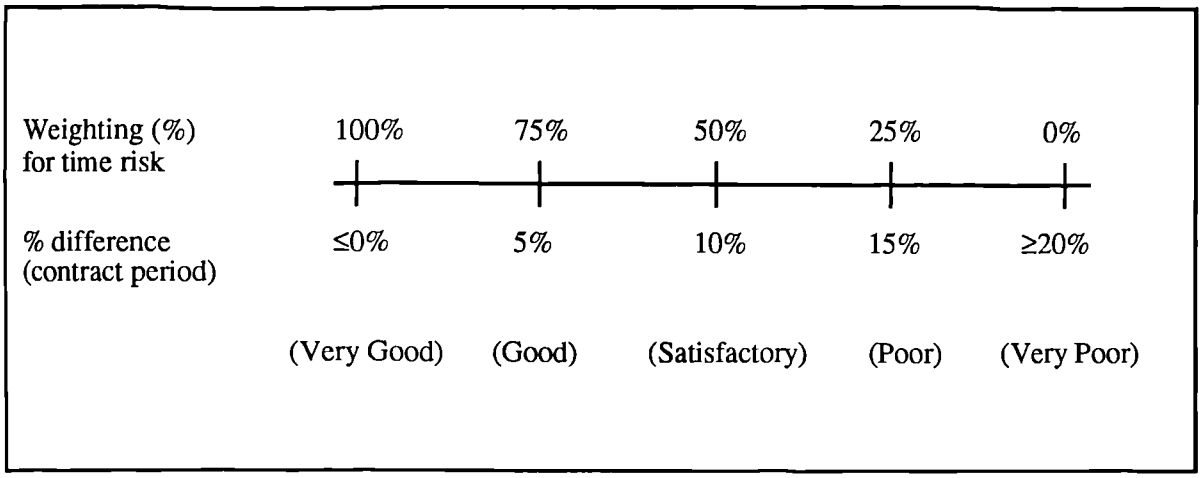

Figure 11.1 Nominal Scale for Time Risk Exposure after NEDO 1983

Figure 11.1 can be interpreted as follows; when a project is completed as planned or earlier (difference between actual and planned completion times ≤0%), time performance is 'very good' and a weight of 100% is assigned to the owner, and when completed 5% over planned time a weight of 75% is allocated to the owner and so on, until ≥ 20% over planned time is regarded as 'very poor' and a 0% weight is allocated. Only project delays caused by the owner are considered in this manner, in other words, time overrun as treated here must be traceable to the client. The owner can positively influence the completion time of the project by giving the ultimate 'go ahead' and restrain from changing his / her mind once the detail design and engineering of the project has begun. Owners change of mind and indecisiveness which is controllable by careful planning, is the major cause of project delays in the industry (Hastak and Vanegas, 1993; Halpin et. al. 1993). It is therefore reasonable to assess owners' roles in the overall completion time of construction projects. Mathematically the relationship between % weighting and % difference between planned contract period and actual as influenced by the client could be expressed as:

$$y_t = 100 - 5x_t ; \quad \text{.....(11.1)}$$

where y_t = weighting (%) corresponding to time;

x_t = % difference between planned contract time and actual time;

y_t = 0% when $x_t \geq 20\%$, and y_t = 100% when $x_t \leq 0\%$.

11.3.2 Cost

Cost overrun on projects can be directly attributed to change orders, which although not the fault of consulting / contracting firms increase the overall project cost and impact on their image; and could affect business survival as other clients are reluctant to employ consultants with history of project cost overruns. Poorly defined client brief, which may ultimately lead to client change of mind, often impacts on final project cost ('Scope', 1986) with the associated risk measured as percentage difference between the final sum paid to the contractor and the agreed contract sum after allowing for variations, or alterations to provisional or prime cost items. Average performance within 10% of the norm (NEDO, 1983), is deemed satisfactory.

Owners can positively influence the cost of the project by careful planning and proper project definition / formulation (CII, 1987, 1990; Jenks and Bacon, 1981). When these measures are implemented, the chances are that the owner will not change his / her mind during the duration of the project thereby positively influencing the cost of the project.

Following the same line of reasoning as under client time performance discussed above the relationship between % weighting and % difference between planned contract sum and actual sum could be expressed as:

$$y_c = 100 - 5x_c ; \quad \text{.....(11.2)}$$

where y_c = weighting (%) corresponding to cost;

x_c = % difference between planned contract sum and actual sum; and

y_c = 0% when $x_c \geq 20\%$, and y_c = 100% when $x_c \leq 0\%$

11.3.3 Fees

This is the amount charged for services provided by consulting firms. Construction consulting firms do not always realise estimated fees particularly in situations where the project cost lies outside the range (£20,000 - £5m) where guidance for arriving at consultants' fee is provided (RIBA, 1990). When the project cost is outside this range, the client and the consultant usually arrive at a fee by agreement. In practice, it is not uncommon for agreed fees not to cover consultant's costs and overhead; resulting from increased operating costs and unforeseen

circumstances such as more demand for services by clients than anticipated, or client's constant change of mind sending the consultant back to the drawing board. Fees obtained can be compared to projected estimates by:

y_f = % of estimated fees realised ;.....(11.3)

11.3.4 Quality

Being subjective, quality achieved is very difficult to determine and could only be related to conformance to established requirements (e.g Construction Industry Institute, 1989; ISO 9000; BS 5750) in terms of functional, technical, aesthetics, comfort and prestige. In this respect consulting firms were required to provide weighting on how the owner influenced the achievement of these measures of quality, on a scale from 1 to 7, where '1' = not influential at all and '7' = very influential. The importance of quality to consulting firms themselves was solicited, on a scale from 1 to 5, where '1' = not important at all and '5' = very important, all values as illustrated in Figure 11.2. These two sets of values are processed to arrive at a score (x_q). See Table 11.5. Owners who are closely involved with their projects are often most satisfied with project quality (Thrush et. al. 1987; Bushait, 1994). It is therefore reasonable to assess owner influence in the achievement of the desired quality on their projects as quality criteria are an important performance indicator (Russell and Skibniewski, 1988; Holt et. al., 1994).

The relationship between % weighting and the score for quality achieved being

$y_q = 20x_q$;.....(11.4)

where y_q = % weighting corresponding to quality risk; and

x_q = score for quality obtained as in Figure 11.2.

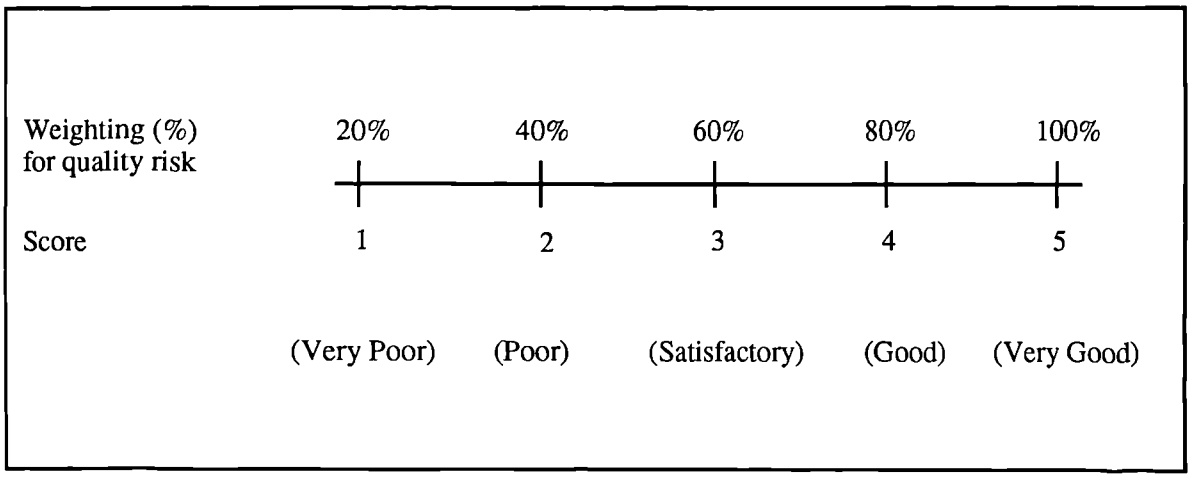

Figure 11.2 Nominal Scale for Quality Risk Exposure

Aggregate Project Outcomes (APO) with respect to owner performance in terms of time, cost, quality and fees can be expressed as follows:

$$APO = W_t*y_t + W_c*y_c + W_q*y_q + W_f*y_f; \quad (11.5)$$

where W_t, W_c, W_q and W_f are weights allocated to time, cost, quality and fees respectively, such that $W_t + W_c + W_q + W_f = 100$. APO is expressed in percentage. These weights vary from practice to practice and depend on the relative importance each firm attaches to time, cost, quality and fees in evaluating project outcomes.

Following the discussion above it is evident that construction owners can directly influence the overall performance of their projects in terms of time, cost and quality and consequently the commercial viability of consulting firms. By assessing owners' influence in each of these performance indicators and aggregating the results (equation 11.5), we are effectively evaluating the owner influence on the overall performance of the project which can only be a reflection of his attributes which formed the basis of the model for evaluating client-generated risks. This reasoning underpinned the use of project outcomes to test the applicability of the model; equation (11.5) represent an acceptable measure to test the model.

APO values reflect actual project outcomes while I values are based on clients' attributes and project characteristics. I values can not be expected to be the same as APO values since client attributes may change for one reason or the other during the execution of a project. For

instance, he may become more interested in the project as it progresses that he commits money to it even though the other sectors of his business may be experiencing financial strains earlier reflected by his financial attribute score. If an I value is equal to APO, perceived risk is equal to actual outcome; if it is less than APO then the model is performing as expected, acting as an early warning signal to consultants. Although not necessarily equal there is a logical connection between APO and I since the client can not metamorphose into a completely new "being", it's attributes quantified by I would reflect in APO. We will seek to explain this relationship statistically.

11.4 Data collection for testing the model

The testing technique adopted is well recognised in the social sciences (Carmines and Zeller, 1979; Lord and Novick, 1968; Nunnally, 1978; Stanley, 1971). Several potential projects were identified by the author for the exercise. The original list included projects in virtually all categories of construction, both public and private. From this list 29 projects were chosen based on:

(i) willingness of the construction consultancies to participate in the study;

(ii) proximity of the participants or access to key individuals; and

(iii) representativeness of the relative size of the project in terms of contract sum.

This was necessary because extensive data was sought from the respondents which required busy staff's time. Thus firms that were interested in the research were invited to participate in the investigation. Data for the model and project outcomes were collected by way of interview or structured mailed questionnaire (see Appendix D). The selected firms were sent a questionnaire together with a covering letter stating the purpose of the exercise. In the covering letter, participants were given a chance to either complete and return the questionnaire or grant an interview. Out of the 29 firms selected, 22 completed and returned the questionnaire while the remaining 7 granted interviews. For the sake of readability, a brief description of each project is provided in Appendix E. However, a matrix comparing the features of the projects is shown in Table 11.1. Projects are not identified by actual names to protect the identity of clients and construction consultancies that participated in the study.

Table 11.1 Project characteristics matrix

Project Identity	Total cost (£)	Overall duration (months)	Type of client	In-house procurement	In-house design	In-house construction	Type of consultants
A	800000	12	Pivate	Yes	Yes	Yes	Private
B	11500000	37	Private	No	No	No	Private
C	13000000	12	Developer	No	No	Yes	Multi disciplinary
D	255000	4	Private	Yes	No	Yes	Multi disciplinary
E	9517	6	Public	Yes	Yes	Yes	Private
F	3000000	20	Public	Yes	Yes	Yes	Public
G	3800000	12	Public	Yes	No	Yes	Private
H	213000	4	Private	No	No	No	Multi disciplinary
I	230000	11	Developer	No	No	No	Private
J	121000	6.5	Private	Yes	Yes	Yes	Private
K	250000	7	Public	Yes	Yes	Yes	Private
L	14000000	32	Private	No	No	Yes	Private
M	450000	3.75	Developer	Yes	No	Yes	Private
N	1640000	7.5	Public	Yes	No	No	Private
O	705635	8	Developer	No	No	Yes	Private
P	1270000	14.75	Developer	Yes	Yes	Yes	Multi disciplinary
Q	N/A	13.5	Developer	Yes	Yes	Yes	Multi disciplinary
R	4280000	18.5	Public	Yes	Yes	Yes	Public
S	1600000	5	Private	No	No	No	Private
T	1545000	7	Private	Yes	No	No	Multi disciplinary
U	212000	8.5	Public	No	No	No	Private
V	1600000	9	Private	No	No	Yes	private
W	3100000	17	Public	Yes	No	No	Private
X	6900000	18	Private	No	No	Yes	Private
Y	456000	6	Public	Yes	Yes	Yes	Private
Z	5300000	24	Public	Yes	No	Yes	Private
AA	7500000	9	Private	No	No	Yes	Private
AB	59000000	29	Public	Yes	No	Yes	Private
AC	795000	12	Public	Yes	Yes	Yes	Multi disciplinary

Summary:

11 private clients; 12 public clients; and 6 developer.

20 private practice; 2 public practice; and 7 multi-disciplinary integrated practice.

The contract sum for the projects ranged from a minimum of £9517 to a maximum of £59m. It could be argued that we can not really deal with these projects in the same context, this is even more so as firms will be able to absorb risks emanating from small projects than big ones; nevertheless, the intention is not about the capacity to absorb risk but identification of client-generated risks irrespective of project sizes or contract sum. Loss accumulation from several small contracts can be just as damaging as a loss resulting from one large project. The

distribution of the sample size with respect to contract size was found to be normally distributed at 5% significance level. The mean contract sum is approximately £5.12m with a median of £15.73m. If the smallest and the largest projects are dropped out as 'outliers' the minimum and maximum contract sums become £121,000 and £14,000,000 respectively; the distribution is still normal, and the mean contract sum becomes £3.25m with a median of £15.73m. The project durations ranged from a minimum of 3.75 months to a maximum of 37 months, a mean of 12.89 months and median of 11 months. The clients have varying degree of project in-house controls (see Table 11.1).

The sample consisted of 20 private, 2 public and 7 multidisciplinary integrated practices. Other characteristics of the projects and the owners are as highlighted in Table 11.1. Table 11.2 presents a summary of the client attributes used for the test together with their weight constants. Respondents provided merit values (m_i) for the client sub-attributes shown on the table. Merit values were solicited on a scale from 0 to 100; before inputting into the model, they should be converted to a scale of 0 to 1 by dividing by 100 to be consistent with the procedure.

Before using equation (11.5), information such as those shown in Tables 11.3 and 11.4 solicited from the respondents were required. These tables are self explanatory. Project A is used as an example to demonstrate the calculation of APO and I using equation (11.5) and the model respectively; results for all projects are summarised in tabular form, discussed later. The main goal of applying the model was to determine it's ability to arrive at similar conclusions as definitive project outcomes.

Table 11.2 Client attributes and their respective weight constant

Main attributes/ sub-attributes	Importance weight of sub-attributes within their group (c_i)	Overall importance weight of main attributes of each group (c_j)
PROJECT FEASIBILITY		12
-Project priorities	28	
-Feasibility study	27	
-Site condition	24	
-Personnel appointment	21	
CLIENT'S DUTIES		11
-Project finance	13	
-Project definition / formulation	12	
-Planning and design	11	
-Project implementation/management	11	
-Human factors	10	
-Schedule duration	10	
-Schedule urgency	10	
-Legal agreements	9	
-Contracting	7	
-Politics / social factors	7	
FINANCIAL STABILITY		11
-Credit worthiness	36	
-Current ratio :Current liabilities	34	
:Current assets	30	
PAST PERFORMANCE		11
-Cost overrun	26	
-Time overrun	26	
-Quality achieve	26	
-Unsuccessful / Successful projects	22	
PROJECT CHARACTERISTICS		10
-Time	18	
-Objectives / sub-objectives	17	
-Complexity	14	
-Type of project	14	
-Cost of project	13	
-Size of project	13	
-Location	11	
ORGANISATIONAL QUALITY		10
-Allocation of project responsibility	36	
-Organisation of project team	33	
-Coordination of project interphase	31	
PAST EXPERIENCE		9
-Experience of personnel	29	
-Project completed	24	
-Construction activities	24	
-Types of projects	23	
QUALITY OF MANAGEMENT		9
-Project management	27	
-Qualification of personnel	26	
-Project auditing	25	
-Quality assurance	22	
CURRENT MARKET CONDITIONS		9
-Economic boom / recession	100	
CLIENT CHARACTERISTICS		8
-Communication	29	
-Type of client	28	
-Structure	22	
-Size of client	18	
-Legal history	5	

Table 11.3a Project outcome information - Time

Project identif-ication	Estimated time (mths)	Actual time (mths)	Percentage difference overrun(+)/ underrun(-)	% attributed to clients	Actual % diff. due to client
A	9	12	+33.33	50	16.67
B	36	37	+2.78	100	2.78
C	12	12	0.00	0	0.00
D	4	4	0.00	0	0.00
E	3	6	+100.00	100	100.00
F	18	20	+11.11	0	0.00
G	12	12	0.00	0	0.00
H	4	4	0.00	0	0.00
I	9	11	+22.22	0	0.00
J	6	6.5	+8.33	100	8.33
K	6	7	+16.67	50	8.33
L	27	32	+18.52	25	4.63
M	3.5	3.75	+7.14	0	0.00
N	6	7.5	+25.00	0.5	0.13
O	5	8	+60.00	30	18.00
P	13	14.75	+13.46	0	0.00
Q	13	13.5	+3.85	90	3.46
R	18	18.5	+2.78	0	0.00
S	5	5	0.00	0	0.00
T	6	7	+16.67	85	14.17
U	8	8.5	+6.25	0	0.00
V	9	9	0.00	0	0.00
W	16	17	+6.25	50	3.13
X	18	18	0.00	0	0.00
Y	6	6	0.00	0	0.00
Z	24	24	0.00	0	0.00
AA	9	9	0.00	0	0.00
AB	26	29	+11.54	100	11.54
AC	12	12	0.00	0	0.00

Table 11.3b Project outcome information - Cost

Project identif-ication	Estimated cost (£)	Actual cost (£)	Percentage difference overrun(+)/ underrun(-)	% attributed to clients	Actual % diff. due to client
A	750000	800000	+6.67	50	3.33
B	8500000	11500000	+35.29	100	35.29
C	12000000	13000000	+8.33	100	8.33
D	220000	255000	+15.91	10	1.59
E	7630	9517	+24.73	100	24.73
F	3000000	3000000	+0.00	0	0.00
G	3600000	3800000	+5.56	100	5.56
H	250000	213000	-14.80	50	-7.40
I	212000	230000	+8.49	50	4.25
J	115000	121000	+5.22	100	5.22
K	240000	250000	+4.17	70	2.92
L	13000000	14000000	+7.69	25	1.92
M	450000	450000	+0.00	0	0.00
N	1736000	1640000	-5.53	100	-5.53
O	594769	705635	+18.64	50	9.32
P	1300000	1270000	-2.31	25	-0.58
Q	3500000	N/A	N/A	75	N/A
R	4142000	4280000	+3.33	0	0.00
S	1200000	1600000	+33.33	0	0.00
T	1520000	1545000	+1.64	100	1.64
U	205000	212000	+3.41	N/A	N/A
V	1700000	1600000	-5.88	0	0.00
W	2950000	3100000	+5.08	75	3.81
X	7000000	6900000	-1.43	0	0.00
Y	420000	450000	+7.14	60	4.29
Z	5000000	5300000	+6.00	6	0.36
AA	8200000	7500000	-8.54	0	0.00
AB	52000000	59000000	+13.46	100	13.46
AC	795000	795000	0.00	0	0.00

N/A - Not Available

Table 11.3c **Project outcome information - Fees**

Project identification	Estimated fees % (1)	Actual fees % (2)	Percentage of actual fees realised (3) = (2)/(1) *100
A	N/A	N/A	-
B	N/A	N/A	-
C	N/A	N/A	-
D	10	5	50
E	10	-2	0
F	N/A	N/A	-
G	2	2.1	100
H	N/A	N/A	-
I	N/A	N/A	-
J	N/A	N/A	-
K	N/A	N/A	-
L	N/A	N/A	-
M	0.7	0.7	100
N	2.5	-5	0
O	3.4	4.2	100
P	5	4.5	90
Q	5	5	100
R	N/A	N/A	-
S	N/A	N/A	-
T	6	-8	0
U	N/A	N/A	-
V	N/A	N/A	-
W	6	6	100
X	10	10	100
Y	7	7	100
Z	N/A	N/A	-
AA	6	6	100
AB	N/A	N/A	-
AC	N/A	N/A	-

N/A - Not Available. Respondents were reluctant to provide information on fees.

Table 11.3d Project outcome:- quality assessment

Projects	Functionality (1)	Functionality (2)	Technicality (1)	Technicality (2)	Aesthetic (1)	Aesthetic (2)	Comfort (1)	Comfort (2)	Prestige (1)	Prestige (2)
A	4	5	2	5	2	5	7	5	2	2
B	7	5	3	5	3	4	6	4	6	3
C	4	4	4	2	7	5	7	5	7	5
D	5	5	3	5	7	1	7	1	7	1
E	1	5	1	5	2	5	1	5	1	5
F	1	5	1	4	1	4	1	2	1	3
G	3	5	3	5	1	1	1	3	1	1
H	7	5	2	5	1	1	1	2	1	2
I	7	5	1	3	3	4	3	4	6	3
J	5	4	3	4	5	5	5	5	6	4
K	5	5	5	4	1	4	1	2	1	4
L	7	5	4	4	5	5	5	5	6	3
M	2	5	2	3	2	4	2	2	2	3
N	7	5	1	3	3	4	5	3	1	4
O	1	4	1	4	3	2	2	2	1	1
P	4	5	5	5	4	5	5	5	4	3
Q	5	5	2	4	6	4	6	4	6	4
R	5	5	2	5	1	5	4	5	6	5
S	7	5	5	4	6	4	5	4	4	3
T	4	5	3	5	1	5	2	4	4	5
U	6	5	1	3	1	5	3	5	3	5
V	3	5	5	1	2	2	4	4	6	3
W	4	4	1	4	2	4	3	4	7	5
X	5	3	3	4	6	5	4	1	7	2
Y	5	5	5	4	1	1	1	1	6	3
Z	6	5	2	5	1	4	1	4	1	2
AA	7	5	5	5	6	3	6	3	6	4
AB	5	4	7	5	5	2	4	3	3	1
AC	5	5	5	4	1	5	3	4	1	3

(1) = client influence in achieving aspect judged by consultant on scale 1 - 7; 7 being most influential.

(2) = importance of realising aspect of quality to consultant on scale 1- 5; 5 being most important.

Table 11.4 Importance weight for project outcomes

Project	Time (w_t)	Cost (w_c)	Quality (w_q)	Fees (w_f)
A	25	25	25	25
B	33	33	33	0
C	20	20	40	20
D	15	50	35	0
E	26	22	26	26
F	15	40	30	15
G	20	20	20	40
H	25	25	25	25
I	30	40	30	0
J	20	45	35	0
K	30	20	30	20
L	25	25	35	15
M	25	25	25	25
N	25	25	35	15
O	30	20	30	20
P	25	25	25	25
Q	25	25	25	25
R	10	60	30	0
S	40	40	10	10
T	30	25	30	15
U	25	25	25	25
V	30	45	20	5
W	25	20	30	25
X	35	40	20	5
Y	30	40	30	0
Z	25	25	25	25
AA	40	20	20	20
AB	20	20	40	20
AC	30	30	30	10

Table was generated by asking respondents to distribute 100 points to time, cost, quality and fees based on their importance on the project.

11.5 Illustrative calculation of 'APO' for project A using equation 11.5

Time

In project A, there was a 33.33% overrun on time, i.e, x_t = (12-9) / 9 * 100 = 33.3%. According to the project consultant, 50% of this 33.3% time difference was due entirely to the client (Table 11.3a). That is, the client caused the project to overrun on time by 16.7% by either his indecision or late provision of information.

Therefore from equation (11.1), y_t = 100 -5*16.7 = 16.5%

Cost

Project A also overran on cost by 6.67% (Table 11.3b), i.e, x_c = (800 -750)/750 * 100 = 6.7%. The respondent confirmed that 50% (i.e 3.3%) of this difference was due entirely to the client as a result of alterations or change orders and none payment of accelerated cost, i.e cost resulting from the client's action.

From equation (11.2), $y_c = 100 - 5*3.3 = \underline{83.5\%}$

Fees

The consultant was reluctant to provide information on either the estimated or actual fees for the project (Table 11.3c)

Quality

The quality achieved on the project was calculated by considering the following aspects: functionality, technicality, aesthetics, comfort and prestige. The consultant was asked to assess the client influence in the achievement of these aspects on a scale from 1 to 7; 7 being most influential. The importance of achieving these aspects to the consultant's practice was also assessed on a scale from 1 to 5, 5 being most important. The consultants' assessment are shown on Table 11.3d for all 29 projects. The calculation of x_q for project A is shown on Table 11.5 below:

Table 11.5 Calculation of 'x_q' score for project A

Aspects	Client influence in achieving aspect (w)	Rational-ized client influence (w/Σw)	Importance of aspect to firm (Im)	(w/Σw)*(Im)
Functional	4	0.24	5	1.18
Technical	2	0.12	5	0.59
Aesthetic	2	0.12	5	0.59
Comfort	7	0.41	5	2.06
Prestige	2	0.12	2	0.24
	Σ17	Σ1	Score =	Σ4.65

Score = x_q = 4.65,

Therefore, from equation (11.4), y_q=20*4.65 = 93%

Equal importance weights were allocated to time, cost, fees and quality by the consultant.

Using equation (11.5),

APO = 0.25 x 16.5 + 0.25 x 83.5 + 0.25 x (N/A) + 0.25 x 93

= 4.125 + 20.875 + N/ A + 23.25

= 48.25%

Since no assessment was given on fees the APO should only be based on 3 performance indicators i.e.

APO = 33.33% x 16.5 + 33.33% x 83.5 + 33.33% x 93 = 64.3%

11.6 Calculation of 'I' for project A using the model

This calculation could be done on a spread sheet as in Figure 11.3. This figure shows level 2 calculation of relative risk exposure indices for each group of attributes; results from these calculations are advanced to level 1 to calculate I. Similarly, I for the other projects are calculated and summarised in Table 11.6.

Level 2 Calculation			Topical	
	Attribute	Variable	risk	Level 2 relative
Main attributes/	weight	merit	exposure	risk exposure
Sub-attributes	constant	values	indices	indices
	(Ci)	(Mi)	(Ti=Ci*Mi)	(Ej=Σ Ti/Σ Ci)
Project feasibility				
project priorities	28	0.50	14.00	
feasibility study	27	0.25	6.75	
site condition	24	0.50	12.00	
personnel appointment	21	0.50	10.50	
				0.433
Client duties				
project finance	13	1.00	13.00	
project def. / form.	12	0.25	3.00	
planning and design	11	0.40	4.40	
project implem. / manag.	11	0.50	5.50	
Human factors	10	0.25	2.50	
schedule duration	10	0.75	7.50	
schedule urgency	10	0.25	2.50	
legal agreements	9	0.50	4.50	
contracting	7	0.10	0.70	
politics / social factors	7	0.50	3.50	
				0.471
Financial stability				
credit worthiness	36	1.00	36.00	
current ratio :current liabilities	34	1.00	34.00	
:current assets	30	1.00	30.00	
				1.000
Past performance				
cost overrun	26	0.75	19.50	
time overrun	26	0.75	19.50	
quality achieve	26	0.75	19.50	
unsuccessful / successful projects	22	N/A		0.750
Project characteristics				
time for completion	18	0.75	13.50	
objectives / sub-objectives	17	N/A		
complexity	14	N/A		
type of project	14	0.50	7.00	
cost of project	13	0.50	6.50	
size of project	13	1.00	13.00	
location	11	0.90	9.90	
				0.723
Organisational quality				
allocation of responsibilities	36	0.50	18.00	
organisation of project team	33	0.50	16.50	
coordinationn of project interphase	31	0.50	15.50	
				0.500

Figure 11.3 Spread sheet calculation of 'I' for project A using the model

Past experience				
experience of personnel	29	0.50	14.50	
number of projects completed	24	N/A		
construction activities	24	N/A		
types of projects	23	N/A		0.500
Quality of management				
project management	27	0.40	10.80	
qualifications of personnel	26	0.40	10.40	
project auditing	25	0.20	5.00	
quality assurance	22	0.40	8.80	
				0.350
Current market conditions				
boom / recession	100	N/A		
				N/A
Client characteristics				
communication	29	0.90	26.10	
type of client	26	0.90	23.40	
structure	22	0.50	11.00	
size of client	18	0.10	1.80	
legal history	5	1.00	5.00	
				0.673
Level 1 Calculation		Level 2		
		relative	Topical	
	Attributes	risk	risk	
	weight	exposure	exposure	Overall risk
Main attributes	constants	indices	indices	exposure index
	(Cj)	(Ej)	(Tj=Cj*Ej)	(I = Σ Tj/Σ Cj)
Project Feasibility	12	0.433	5.190	
Client Duties	11	0.471	5.181	
Financial Stability	11	1.000	11.000	
Past Performance	11	0.750	8.250	
Project Characteristics	10	0.723	7.232	
Organisational Quality	10	0.500	5.000	
Past Experience	9	0.500	4.500	
Quality of Management	9	0.350	3.150	
Current Market Condition	9	N/A		
Client Characteristics	8	0.673	5.384	
				0.603

The overall risk exposure the consultant face accepting work from this client calculated using the model is 60.3%. Attributes whose merit values are not provided play no part in the calculation of 'I'

Figure 11.3 Continued

Table 11.6 Overall risk exposure indices (I) and (APO)

Project ident. (1)	Aggregate project outcome using equation 5 (2)	Risk exposure index using the model (3)	Deviation (4)=(3)-(2)	Percent. Deviation (5)= (4/2)x100
A	64.3	60.3	-4.1	-6.2
B	89.7	72.0	-17.7	-19.7
C	84.1	51.5	-32.6	-38.8
D	78.5	64.2	-14.3	-18.2
E	26.0	38.3	+12.3	+47.3
F	90.1	75.9	-14.2	-15.8
G	90.0	80.9	-9.1	-10.1
H	94.5	56.6	-37.9	-40.1
I	85.5	43.7	-41.8	-48.9
J	75.9	58.5	-17.4	-22.9
K	75.1	65.3	-9.8	-13.0
L	85.5	87.3	+1.8	+2.1
M	92.0	70.0	-22.0	-23.9
N	78.3	83.6	+5.3	+6.8
O	48.0	50.4	+2.4	+5.0
P	95.7	83.2	-12.5	-13.1
Q	90.5	65.5	-25.0	-27.6
R	100.0	83.5	-16.5	-16.5
S	98.0	63.9	-34.1	-34.8
T	60.9	57.0	-3.9	-6.4
U	98.6	67.6	-31.0	-31.4
V	91.2	78.6	-12.6	-13.8
W	88.7	55.5	-33.2	-37.4
X	92.0	77.8	-14.2	-15.4
Y	83.1	60.6	-22.5	-27.1
Z	96.4	77.8	-18.6	-19.3
AA	96.0	84.9	-11.1	-11.6
AB	52.1	68.8	+16.7	+32.1
AC	87.3	67.0	-20.3	-23.3

Correlation Analysis between (2) and (3):

Pearson Correlation

Coefficient: 0.571 Significance: 0.01

11.7 Discussion of validation results

Following the risk classification reference (Table 9.4), the test result from the model gave the same range of risk classification reference as those calculated using actual project outcomes for projects A, D, E, G, K, L, O, P, R, and AA, i.e in 10 out of the 29 projects the same performance range was achieved. In 9 out of these 10 projects (i.e excluding project E) the clients performed satisfactorily and the project consultants worked confidently for them. On project E which was the smallest contract, the client posed substantial financial risk to the firm. In fact, the consultants made a loss on the project and would have been better off not working for the client even if they were desperate for work at the time! Although the firm absorbed the loss, working for such clients continuously will undoubtedly jeopardise the long term commercial viability of the consulting firm.

The model predicted a lower risk classification reference range on 17 projects: B, C, F, H, I, J, M, Q, S, T, U, V, W, X, Y, Z and AC. In only two of the projects N and AB did the model predict a higher range; for project N, the model predicted a range of $80 < I \leq 100$ while the range from equation 5 was $60 < APO \leq 80$; similarly for AB the ranges were $60 < I \leq 80$ and $40 < APO \leq 60$ respectively. In these two cases the model predicted that the clients were better than the project outcomes indicate. The client personnel who started these projects were changed during construction as their inadequacy became apparent. The projects benefited greatly by these changes with the clients liaising more with the consultants to resolve difficulties. The model's conservative predictions on 17 projects are as expected as it was primarily designed as an early warning system. The deviations between I and APO would now be explained.

Examining the projects individually, the differences in APO and I values range from -41.8 to +16.7 corresponding to -48.9% to +47.3% respectively (Table 11.6). The model is not expected to yield exactly the same results as equation (11.5) but aims at predicting the same range as Aggregate Project Outcome or at worst on the conservative side of APO to fulfil it's role as an early warning system. For approximately 93% of the cases the model seem to be working correctly. A correlation analysis was conducted on the values calculated using both methods with the aid of the SPSS statistical package (Kinear and Gray, 1993) and a correlation

coefficient of 0.571 at 1% significance level was obtained (Table 11.6). This correlation clearly shows a significant relationship between APO and I values. To further explore the relationship a simple regression analysis was performed on APO and I values with APO the dependent variable and I the independent variable. A coefficient of determination of 0.327 was obtained; in other words I accounts for 33% of the variability in APO values. The remaining 67% can be accounted for by the fact that consultants tend to estimate higher risks at the beginning of the project when little information is known about the project. As the project progresses a relationship based on increased information and communication develop between the parties leading to solutions for seemingly insurmountable problems. Relationship between parties during construction projects is currently being researched by Bennett (1994).

To explain further the differences in APO and I values the percentage deviation was regressed on actual project time and cost and a coefficient of determination of 17.4% obtained. In other words, project time and cost explained only 17.4% of the deviations. When the projects were disaggregated according to contract sizes: ≤£0.5m, between £0.5m to £5m and ≥£5m representing small, medium and large contracts respectively; and the regression analysis repeated, significant results were obtained (Table 11.7). Results indicate that small and medium sized contracts exhibit more deviations than large contracts. Perhaps more importance is attached to estimating risks on larger contracts by consultants because they will be difficult to mitigate. 71% of the variations in percentage deviations on large contracts could be explained by time and cost.

Furthermore, an analysis of variance (ANOVA) was performed on the percentage deviation of values shown on Table 11.6 according to client type (i.e, private, public and developer). The number of projects in each cell is shown in Table 11.8. To limit complex interactions involving three or more factors, the ANOVA analysis was restricted to only private and public sector clients. Results from this analysis is presented on Tables 11.9 and 11.10 indicating that public clients have low percentage deviation (-8.97%) compared to private clients (-17.00%). This can possibly be explained by the fact that public clients have more in-house project controls than private clients and therefore seen to be more experienced (see Table 11.1). Large projects have the lowest deviation of -5.30% compared to -15.06% and -15.75% for small and medium sized contracts respectively .

Table 11.7 Statistical description of projects according to contract sum

Parameters	Range of contract sum ≤ £0.5m (Small)	£0.5m to £5m (Medium)	≥£5m (Large)	All
No. of projects	9	12	7	28
Mean completion time (mths)	6.3	11.9	23	12.9
Mean contract sum (£)	240,724	2,011,303	16,742,857	5,125,077
Mean deviation of I	-20.5	-12.7	-10.8	-14.7
Mean % deviation of I	-19.8	-13.8	-10.1	-14.7
Coefficient of determination	0.402	0.105	0.709	0.174
t-statistic (time)	1.10	0.45	0.64	0.41
t-statistic (cost)	1.86	0.46	2.7*	0.76

* Significant at 5% level

Table 11.8 Number of project in each cell

Type of Client	Size of Contract Small	Medium	Large	Total
Private	3	4	4	11
Public	4	6	2	12
Developer	2	3	1	6
Total	9	13	7	29

Table 11.9 Mean percentage deviation of I: private and public clients only

Type of Client	Size of Contract Small	Medium	Large	Row mean
Private	-23.07	-15.30	-11.15	-17.00
Public	-6.05	-16.05	6.04	-8.97
Column mean	-15.06	-15.75	-5.30	

Table 11.10 Analysis of Variance

Source of variation	Sum squares	DF	Mean square	F	Significance of F
Main effect	1069	3	356	0.814	0.504
Type of client	609	1	609	1.392	0.254
Size of contract	700	2	350	0.799	0.466
2-way interaction (Type of client / Size of contract)	559	2	279	0.639	0.540

11.8 Sensitivity analysis

Normality test on the APO and I values show that they do not exhibit normal probability distribution. Rather than normalising the data, the Minitab Statistical Package (Ryan et al., 1976) was used to simulate normal values corresponding to the actual means and standard deviations of APO and I values respectively. Statistical description of the simulated data is shown on Table 11.11. Figure 11.4 shows interval estimation of the means of APO and I.

Table 11.11 Normalised data

Values	N	Mean	Standard Deviation
I	29	69.37	12.52
APO	29	84.64	16.49

Let us now use these data to develop a 90% confidence interval for the difference in mean between APO and I values (Fig. 11.4). The interval estimation of the difference between two means is given by:

$$\textbf{Difference in mean} \pm t_{a/2}\ \textbf{(Standard Deviation)}$$

the t value is based on a t distribution with 56 (29+29-2) degrees of freedom and 1-a is the confidence coefficient. With a = 0.10, $t_{a/2} = t_{.05} = 1.671$. Thus the interval estimate becomes

$$69.37 - 84.64 \pm 1.671\ (3.844)$$

$$-15.27 \pm 6.42$$

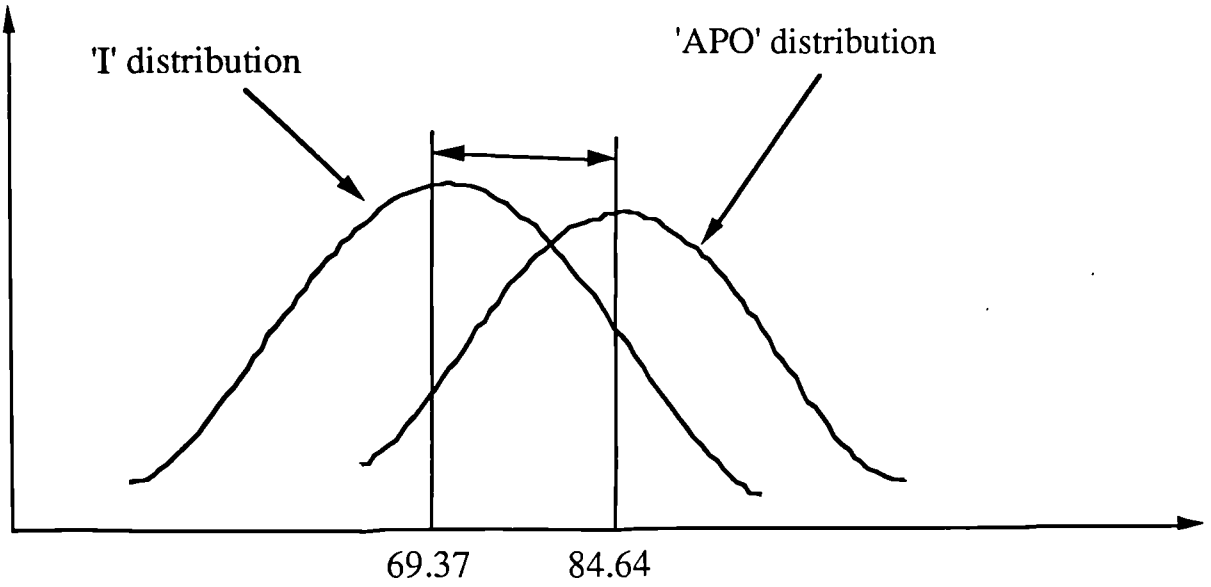

Figure 11.4 Minitab confidence interval estimation

At 90% level of confidence, the interval estimate of the difference in mean between APO and I values is -21.69 to -8.85. Thus we can be fairly certain that I values would be less than APO values, on the average, by at least nine and maybe by as much as 22.

How sensitive are the risk exposure indices to variations in the weight constants for the model? In other words, how sensitive is I to changes in the weight constants. The merit values cannot be treated in the same way as weight constants. This is because they are variables in the model changing with different projects to reflect the client's ability with respect to an attribute unlike the weight constants which do not change with projects. To limit the complexity of the results, the sensitivity analysis on weight constants are restricted to level 1 attribute weight constants only.

We are interested in how the mean risk exposure index (I_{mean}) varies based on some assumptions. To calculate I_{mean} the average of merit values across all 29 projects was first calculated and used as input to the model. The I_{mean} resulting from this calculation was found to be 69.4. To study the sensitivity of this value the following assumptions were made:

1 An incremental change of ±10% to ±100% in each main attribute is assumed. While one is changing the others are held constant.

2 An incremental change of ±10% to ±100% in all main attributes is assumed to occur simultaneously.

Results from the first assumption are shown in Figure 11.5. It should be noted that for attributes with equal weights, the variation in I_{mean} will be the same. A 10% improvement in *project feasibility* improves the mean risk index by approximately 1.2%; the corresponding figure for *client characteristics* being 0.7%. Generally, percentage changes in weight constant does not affect I_{mean} significantly as shown by the gradients of the curves 0.0810 (maximum) for *project feasibility* to 0.0547 (minimum) for *client characteristics*. Changes in the weight constant of *project feasibility* affects I_{mean} more than any other attribute; see gradient and weight. The smallest variation in I_{mean} was observed in *client characteristics*.

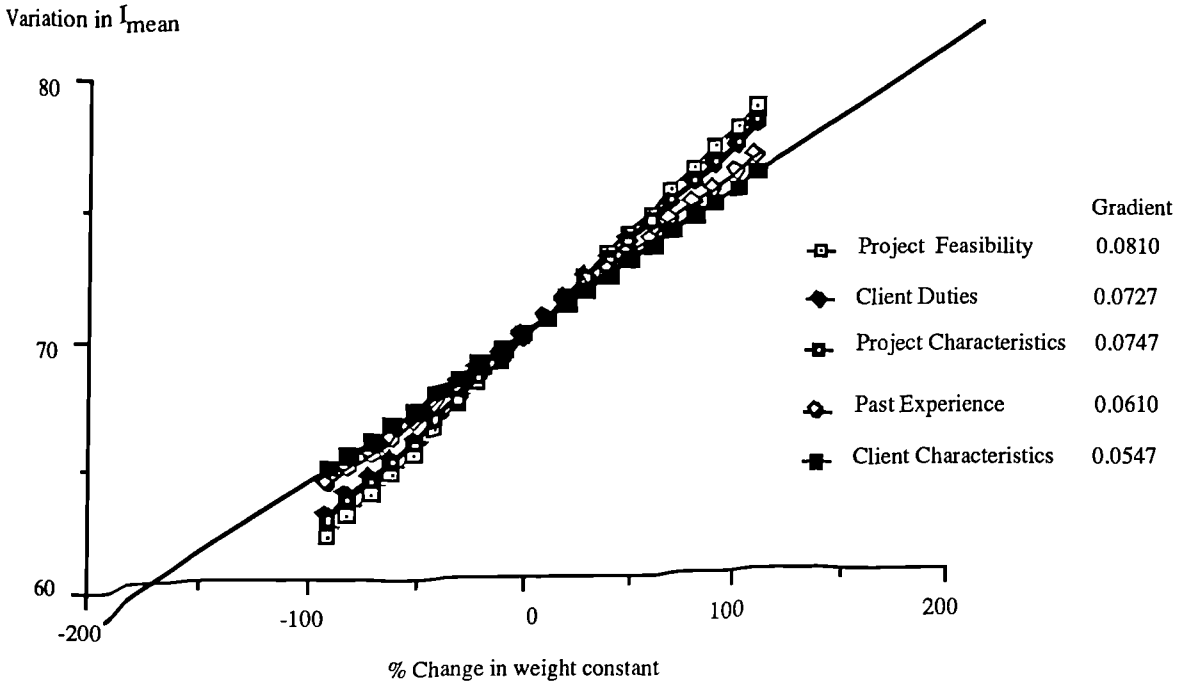

Figure 11.5 Comparative variation in I_{mean} Vs. weight constant of 5 project attributes

Result from the second assumption is shown in Figure 11.6. If all weight constants change simultaneously there would be a significant change in I_{mean}. For instance, a 10% increase in weight constant for all attributes improves the mean risk index by up 10%. Overall the relationship between I_{mean} and % changes in weight is 1 to 0.6941 (see equation of the curve).

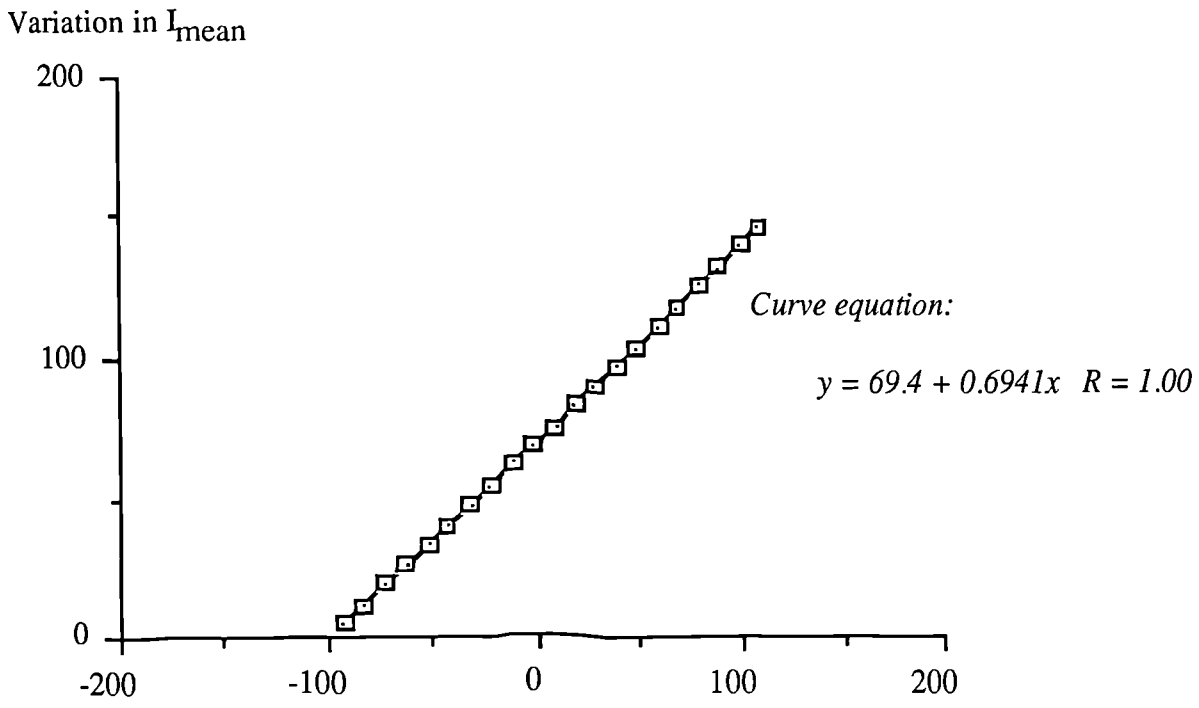

Figure 11.6 Variation in I_{mean} Vs. change in weight constant across all main attributes simultaneously

11.9 Consultants' view

It was interesting to know the consultants' reactions to the model performance; in particular to determine how accurately the model identified the client attributes that were likely to cause problems based on their actual experience with the client and on the project. To achieve this, five (i.e, B, E, O, R and AA) of the 29 projects were chosen at random and the results of the model discussed with respective consultants.

Generally, the model predicted that the client for project B was good, however, a plot of the client profile indicated that he was weak in two attributes *past performance* and *past experience*. The consultant indicated that he had particular difficulties in dealing with the client with respect to these two attributes. The client, a private football club, has had no previous experience of the type of project, i.e. they never built a stadium before and have collectively not been involved with any other stadium construction before and really did not know what to do / expect. Had the consultant known this at project inception, they claimed, they would have taken more time to explain stadium construction and possibly directed more resources. It took them 3 months to discover that the clients directors were only "acting up".

The model did not find the client for project E to be good. The client was worst in the attributes: *past performance* and *organisational quality*. The consultant experienced this through "frequent change of mind" by the client with consequent delays and extra costs and often the client did not want to bear the consequences of his actions. As a result, the consultant lost money on the project. The consultant confirmed that had this been a very large contract it would have driven them to bankruptcy. The consultant would have been better off keeping away from this type of client.

For project O, the model found the client to be weakest in the *quality of management*; for project R in the *feasibility study* and for project AA in *organisational quality*. The consulting firms confirmed that they had difficulties in dealing with the clients with respect to these attributes. While the I's in projects R and AA were more than 80 which is very satisfactory, this additional information of inadequacy of *feasibility study* and *organisational quality* would have been useful pointers to where attention need be paid. In the case of project R, the

consultants asserted that if they were aware right at the beginning of the project inception that the client is weak in project *feasibility study*, they would have 'made' the client to understand the full advantage of an adequate feasibility study. Proper feasibility study which might appear expensive at the time would safe money in the long run; most projects delays and cost overruns have been traced back to poor feasibility study at the inception stage (Gruneberg and Weight, 1990). In case of project AA whose client had poor *organisational quality*, the consultant would have encouraged the client to put experienced personnel on the job.

11.10 Applications

The client evaluation model reported is based on the complex interaction of clients' attributes and project characteristics in relation to consultants' performance and commercial viability. The model was originally developed to be used by consulting firms but it is envisaged that contracting firms can also use the model with some slight modifications. Client organisations can also use the model for self assessment.

Ideally, the model should be implemented when consulting firms have enough information on the client / project. Early implementation of the model enables the consultant to appreciate their risk exposure when accepting work from client and hence take corrective action(s). The model should be implemented by an individual that possesses an understanding of client evaluation in relation to the commercial viability of their practice.

To use the model, data should be collected on the client / project using the tested questionnaire developed for this purpose (see Appendix D). The model could be coded into a computer programme that enables the questionnaire to be completed on-line, analyse the responses, and instantaneously recommend a cause of action. Such a programme will significantly reduce the time required for analysis.

11.10 Summary

Modelling the relationships between clients' attributes, client-generated risks and project outcomes from consultants perspective has illuminated our understanding of risk analysis in the industry particularly as risk analysis has mostly been performed from the clients' point of view.

The model has shown that through their attributes construction clients pose risks which can be reasonably quantified to consulting firms. The client evaluation model can (and is already in firms that participated in its development) be an invaluable early warning device alerting consultants to areas of weaknesses in clients they may be proposing to work for. While not yet perfect and because of the numerous sub-attributes on which judgments have to be made the model would require further refinements but, at the least, a framework for systematic client evaluation has been developed and tested.

To validate the predictive ability of the model it would be necessary to test it on live projects. The method used to test the applicability of the framework of the model utilises definitive project outcomes from 29 past projects and comparing them with results from the model. The model seems to be working correctly. Furthermore, five of the 29 projects were chosen at random and the results discussed with the respective consultants. There were agreement on clients' weaknesses identified by the model with the consultants' experience after working with the clients. This would seem to support the view that the systematic framework of the model is working correctly. However, the model need to be tested on live projects to confirmed its validity as a predictive tool.

CHAPTER 12

CHAPTER 12
CONCLUSIONS, RECOMMENDATIONS AND FURTHER RESEARCH

12.1 Conclusions

This thesis set out to evaluate client evaluation in construction consultancies. Based on literature survey it was hypothesised that rather than relying solely on the 'financial stability' attribute of clients as it is in current practice, construction consultancy will have a more complete profile of their clients prior to project commission if they consider other organisational attributes. To achieve a more responsive and client active contract management by consultancies there is a need for a coherent client evaluation framework rather than the present adhoc approach.

To develop such a framework, it was necessary to study the construction client itself. From literature survey factors influencing clients' decision to embark on a construction project were studied. This led to the hypothesis that many factors apart from financial consideration influence decisions in the client organisation including the decision to build. Clients rated the importance of factors influencing their decision to build on a seven point Likert scale. The ratings were converted into relative importance indices and the first five most important factors were found to be 'need for more facilities', 'profit / economic reasons', 'location', 'user preference', and 'social expectation'. Using factor analysis, three principal factors which influence client decision to build were extracted namely: (i) organisational factors (director's preference, corporate ego, status / prestige, location, and profit / economic reasons); (ii) structural issues (change of attitude, cultural influence, social expectation, and workers' pressure); and (iii) externalities (need for more facilities, and users' preference). All these act together to form a complex web of factors influencing the clients' decision to build.

Construction clients have a plethora of needs when embarking on projects. The most common needs (termed fundamental needs) were identified and studied. The three most important needs were found to be 'function', 'safety', and 'quality' which contradicts the famous trio of time, cost and quality. Client responsibilities in the construction process were also identified and studied. The most important client responsibilities as perceived by clients themselves were

found to be: 'in-house planning and design', 'project finance', 'project implementation / management', and 'project definition / formulation. Although not in the same order, project consultants broadly agree with these as the main responsibilities they would expect clients to perform lending credence to support the hypothesis that the responsibilities of clients in the construction processs as perceived by clients themselves and project consultants are similar.

Apart from identifying clients needs and responsibilities the research also sought to determine the needs as well as factors influencing the commercial viability of consulting firms. The most important determinants of the commercial viability of consulting firms as perceived by consultants themselves were found to be: 'high quality design', 'good image / prestige', 'profit making', 'positive cash flow', and 'clarity of client needs'. The variables were factor analysed and four principal determinants of commercial viability extracted namely: (i) drive to operate at full capacity (good image/prestige and working at full capacity); (ii) drive for financial stability (profit making, and increased turnover); (iii) drive to produce high quality design (design, and clarity of client needs); and (iv) drive to satisfy clients (client satisfaction, and positive cash flow). The extracted factors were then correlated with client attributes and significant correlation coefficients were obtained for three of the factors to confirm that not only 'financial stability' attribute of client influence the commercial viability of construction consulting firms. Other organisational attributes of clients are important.

After establishing that other attributes of clients affect the performance of project consultants, the thesis progressed to develop a systematic framework for evaluating construction clients. Evaluating client-generated risks to project consultants entailed the development of a quantifying technique based on the multi-attribute analysis approach because a multitude of client and project variables influencing the performance of consultants have been identified. The technique used to quantify this risk has two levels of abstraction. Level 1 consists of clients attributes of major interest to consultants in the construction process. These are subdivided at level 2 into groups of mutually related attributes (sub-attributes), each requiring simple judgments from project consultants based on their experience with clients. Results from level 2 are processed through level 1 into a single non-dimensional value which represents the potential risk exposure of project consultants to their clients, which affords the consultants an

appreciation of the risk they face accepting work from their clients and the opportunity to take corrective action.

The technique is based on the derivation of attributes weight constants for all the attributes from their relative importance indices. The framework was tested for applicability on 29 projects and was found to be capable of in dentifying areas of strength and weakness in construction client organisations. Sensitivity analysis on the model demonstrates how client attributes could be modified to improve overall project performance. Clients can directly influence the performance of their projects by paying careful attention to the interplay between the attributes identified in this thesis.

12.2 Recommendations

Consulting firms are facing fundamental changes not only in the nature of their clients but also in the milieu in which their work is done; there should be a client evaluation policy the basis of which is described in this thesis with the following advantages:

(i) During boom in construction activities, most construction firms may find themselves operating at or near full capacity. A client evaluation policy may help identify good or bad clients in a golden scenario where consultants have the opportunity to 'select' who to work for!

(ii) Client evaluation policy will also help identify high risk clients. Evaluating the attributes identified in this investigations, clients' strengths and weaknesses in each could be ascertained. Client with weaknesses in all the attributes would be treated with caution.

(iii) Client evaluation policy will help identify potential business opportunities and ventures i.e by evaluating the client, construction consulting firms may discover much more potential than the initial size of the job indicates.

(iv) Above all, a client evaluation policy will help the consultancy in directing resources to

areas of client weaknesses during project implementation / management, which may turn a bad situation into a good one. If for example, the client organisational quality is weak the consultants may make up for this by putting their best project managers on the job to make up for the expected deficiencies.

It is suggested that the construction industry as a whole and construction consulting firms in particular should have a central data bank of performance of clients who use the services of the industry regularly. Existing organisations like the Association of Consulting Engineers (ACE), the Institution of Civil Engineers (ICE), or the Royal Institute of British Architects (RIBA), etc. should create a department within their organisations to store information on client performance from their members. A data base of client performance on each of the attributes identified in this thesis should be created. This would be easy to achieve as it only involves members furnishing information on their clients for recently completed projects. The data should be coordinated by one main body. The information can then be grouped according to client types and project sizes; or according to excellent, good and poor performing clients. Stored on a computer, the data could be accessed 'on-line' by subscribing firms. It is envisaged that construction firms will find such data invaluable as the evaluation of clients gains ground. This will not only help to assess the performance of potential client but will also help in improving project performance as effort will be made to modify client weaknesses in previous projects in line with the current project. In other words, knowledge gained from previous engagement, particularly difficulties encountered and how they were resolved, would be of great help on current and future projects.

12.2.1 Golden scenario

Let us consider a golden scenario where the consultant is in a position to select to work for one client out of three potential employers. With the model proposed in this thesis, the consultant can simply calculate and examine the overall indices for the three employers and select the best one. Better still, the client profiles can be presented in graphical form as in Figure 12.1. Clearly in this case, the consultant should select employer no. 2. However, detailed examination of the profile of this particular employer shows that he/she is weakest on the following attributes: *current market condition* and *client characteristics* (type of client,

communication channel, structure, size, and legal history). That is the employer might attempt to influence the pricing policy of the consulting firm bearing in mind the prevailing market situation; or slow the progress of the project through poor communication as a result of complex organisational structure. In this case, the consultant will pay more attention to these attributes.

It could be argued that cut-off points should have been determined for all the attributes below which the consultant may not accept to work for the client, particularly as a client could have a good overall index and do very poorly on one of the attributes. This approach is not suitable for an investigation of this nature because it would be difficult to find a client who will satisfy all the attributes. In fact, it is envisaged that using the model in this way no client will ever be selected because most client will be found deficient in at least one of the attributes. The emphasis of the model is the early warning signal it gives to consultants; thus paying more attention to areas of client weakness particularly during the execution of the project. However, individual consulting firms could determine cut-off points for all the attributes as generalised cut-off points are impractical. Moreover, the management within a consulting firm is in the best position to judge the effect of a client / project on the commercial viability of the practice after the assessment using the model.

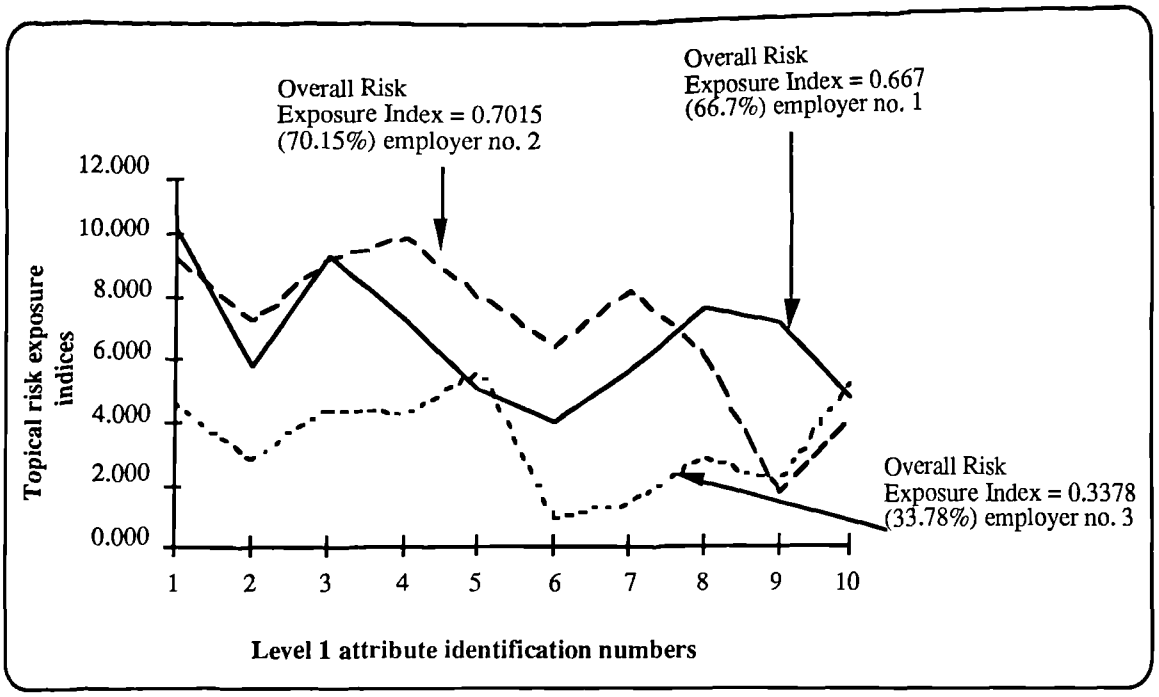

Figure 12.1 Project selection using client profiles

It should also be appreciated that a client profile is not static but dynamic. For instance, a client's financial stability may change over time; with every project completed the client gains more experience. This change could be taken into account by the modification of the attributes weight constant as explained in chapter 9. The assignment of attribute merit value should also reflect this change.

12.3 Further research

The nature of the investigation reported in this thesis is such that it would not have been possible to delve into the evaluation of client-generated risks to consultant without first studying both the client and the consultants' organisations. However, these studies were only exploratory to help towards the main objective of the investigation reported in this thesis.

In chapter 5, we looked at factors influencing the client's decision to build and showed that there are a complexity of factors influencing the decision to build. These factors can be studied in more detail and tied to the client business. That is by studying these factors in conjunction

with the client's business, one should be able to anticipate when a client need a building and more importantly be able to provide a building that would satisfy the factors that generate the need in the first instance.

Another potential area of research from this work is the advancement of the client evaluation model into a Case Based Expert System (CBES). This will involve tapping the knowledge of experts in the area on a case by case basis, then building an expert system using any of the existing shell such as Crystal. An expert system of this nature will demand answer to questions 'on-line', analyse the responses, and instantaneously recommend a cause of action. Such a programme will significantly reduce the time required for analysis. What is important is that client organisations would be able to use such a system for self assessment; particularly as the system would recommend a cause of action for attributes in which the client is not very good at.

Tracing client characteristics / behaviour from project inception to completion and the cumulative effects on contractors' outcomes is another fruitful area of further investigation. Effects of main contractors on sub-contractors can be similarly investigated.

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APPENDIX A

APPENDIX A

CLIENTS' QUESTIONNAIRE

CLIENT INVOLVEMENT IN CONSTRUCTION PROJECTS: A SURVEY OF THE FACTORS THAT INFLUENCE CONSTRUCTION CLIENTS' DECISION TO BUILD.

This is part of a research program to evaluate the variables that influence construction clients' decision to build. The aim of the research is to establish the variables that instigate construction clients' decision to build and ascertain the roles clients play to ensure that their buildings meet their requirements. Your answers to this questionnaire will be treated in strictest confidence and used for academic purposes only. Your response to this questionnaire is highly appreciated.

Please encircle the correct answer in each case or otherwise as stated.

Q1 Please tick one box to indicate which of the following best describes your 'client type', and indicate number of staff employed*

	Number of staff				
	1 - 5	6 - 10	11 - 30	31 - 50	51+
Developer client					
Private client					
Public client					
Others (please specify) ----------					

* staff to include all those actively involved in all your projects

Q2 How many years has your organisation been in the construction business? ---------years

Q3 How many projects has your organisation completed in the past 5 years ? -------projects

Q4 What is the actual number of staff in your organisation? ----------staff

Q5 What is your turnover for the last financial year? £----------

Q6 Most organisations and individuals have some factors that instigate their decision to build. On a scale of 1 to 7, where 1 = bottom mark (bm) and 7 = top mark (tm), what level of importance will you attach to each factor listed below.

We decided to start a new building because of:	bm						tm
(a) profit/economic reasons	1	2	3	4	5	6	7
(b) corporate ego	1	2	3	4	5	6	7
(c) workers' pressure	1	2	3	4	5	6	7
(d) social expectation	1	2	3	4	5	6	7
(e) Directors' preference	1	2	3	4	5	6	7
(f) users preference	1	2	3	4	5	6	7
(g) status/prestige	1	2	3	4	5	6	7
(h) location	1	2	3	4	5	6	7
(i) need for more facility	1	2	3	4	5	6	7
(j) change of attitudes	1	2	3	4	5	6	7
(k) cultural influence	1	2	3	4	5	6	7
(l) others (please specify)							
(l1)	1	2	3	4	5	6	7
(l2)	1	2	3	4	5	6	7
(l3)	1	2	3	4	5	6	7

Q7 Most organisations tend to appreciate the original intentions of their decision to build only after a complete study of their organisation.

(a) Does your organisation carry out such studies?----------YES / NO

(b) If YES, was it carried out in-house or with the help of outside consultants?

☐ in-house ☐ outside consultant

Q8 Which of the following will you say is your average contract size? (please tick a box)

☐ Under £50000

☐ £50000 - under £500000

☐ £500000 - under £1million

☐ £1 million - under £10 millions

☐ £10 millions - under £15 millions

☐ Over £15 millions

Q9 Once the decision to build has been taken, it is assumed that there are certain fundamental needs that must be satisfied by all projects. Below are some statements about some of these fundamental needs. On a scale of 1 to 7, where 1 = bottom mark (bm) and 7 = top mark (tm), what level of importance will you attach to each need. (Please encircle one number in each case)

	bm						tm
(a) The building should achieve some degree of ECONOMY----------	1	2	3	4	5	6	7
(b) The building must FUNCTION as intended----------	1	2	3	4	5	6	7
(c) The building must be SAFE through out its construction and operating life----------	1	2	3	4	5	6	7
(d) The building must achieve a minimum amount of QUALITY------	1	2	3	4	5	6	7
(e) The building must be completed on TIME----------	1	2	3	4	5	6	7
(f) The building must have low RUNNING and MAINTENANCE COST----------	1	2	3	4	5	6	7
(g) The building must be flexible to accommod. new uses at any time-	1	2	3	4	5	6	7
(h) Others (please specify)							
(h1)----------	1	2	3	4	5	6	7
(h2)----------	1	2	3	4	5	6	7

Q10 In order for the building to satisfy all your needs adequately, you need to assume responsibility on certain aspects of the project. On a scale of 1 to 7, where 1 = bottom mark (bm) and 7 = top mark (tm), what level of importance will you attach to each aspect of the project listed below?. (Please encircle one number in each case)

(a) **Project definition,** this involve briefing (dialog) between you and your consultant.	bm						tm
(a1) You ensure that this is adequately done----------	1	2	3	4	5	6	7
(a2) You have experienced employees who meet consultants during the initial briefing----------	1	2	3	4	5	6	7
(a3) The same person(s) is responsible for maintaining contact with the consultant throughout the briefing and the design-------	1	2	3	4	5	6	7
(b) **Finance**							
(b1) You make sure that you have adequate finance to see your project through----------	1	2	3	4	5	6	7
(b2) You pay all project invoices on time----------	1	2	3	4	5	6	7

(c) You do ask your consultant to present you with the available contractual routes---------- 1 2 3 4 5 6 7

(d) You do pay enough attention to legal matters---------- 1 2 3 4 5 6 7

(e) You do instil the required level of urgency in consultants-------- 1 2 3 4 5 6 7

(f) You do pay enough attention to human factors e.g skill---------- 1 2 3 4 5 6 7

(g) You always make sure that the project implementation and management is carried out adequately---------- 1 2 3 4 5 6 7

(h) You do all your best to ensure that the project planning and design is carried out correctly---------- 1 2 3 4 5 6 7

(i) You do pay enough attention to politics/social factors---------- 1 2 3 4 5 6 7

(j) You insist on your project following the schedule duration as planned---------- 1 2 3 4 5 6 7

(k) You ensure that both your chosen consultant/contractor are competent and experienced---------- 1 2 3 4 5 6 7

(l) Others (please specify)

(l1) .....---------- 1 2 3 4 5 6 7

(l2) .....---------- 1 2 3 4 5 6 7

Q11 If project success means that the project satisfied your requirements, what percentage of your projects completed over the past 5 years will you classify as:

.....successful projects .....unsuccessful projects

Q12 Client's attributes

(a) How will you describe the structure of your organisation?-------- Simple Complex

(b) How will you describe the communication channels in your organisation?

Centralised Decentralised

Q13 Do you quantify the risks that poor consultation / representation by the Architects, QS, or Engineers may pose to your project(s) being successfully executed? YES / NO

If YES how?----------

Q14 How will you apportion blame on projects not successfully completed (please give your answer in percentage terms e.g if you were responsible for half of the blame, give yourself 50%).

Yourself (client)	-------
Consultants	-------
Contractor	-------
	100%

Q15 If it were possible to insure your projects against failure in terms of time, cost, and quality how much premium will you be ready to pay for the following project sizes:

Project Size	Premium
< £50000	----------
50000-500000	----------
500000-£ 1m	----------
£ 1m - £10m	----------
> £10m	----------

Please tick the box below if you would like a summary of the findings from this survey

☐

Thank you for your cooperation

S. T. KOMETA

APPENDIX B

APPENDIX B

CONSULTANTS' QUESTIONNAIRE

AN EVALUATION OF THE POTENTIAL RISKS TO PROJECT CONSULTANTS RESULTING FROM CLIENT PERFORMANCE.

This research aims at developing a model to predict the commercial viability of construction consulting firms based on the types and competency of client organisation. Your answers to this questionnaire will be treated in strictest confidence and used for academic purposes only. Your response to this questionnaire is highly appreciated.

Please encircle the correct answer in each case or otherwise as stated.

Q1 THE CONSULTANCY

(a) Please tick one box to indicate which of the following best describe your consultancy, and indicate number of staff employed*

	Number of staff				
	1 - 5	6 - 10	11 - 30	31 - 50	51+
Private Consultancy Firm					
Public Consultantcy Firm					
Private Multi-disciplinary / integrated Practice					
Others (please specify) ----------					

* staff to include all those actively involved in all your project

(b) I will describe my firm as a: (please tick as appropriate)

☐ Civil Engineering Consultancy ☐ Building Services Consultancy

☐ Structural Engineering Consultancy ☐ Project Management Consultancy

☐ Mix ☐ Any other (please specify)

(c) How many years has your practice been in business? --------years.

(d) How many projects has your practice completed in the last five years? ----------Projects

(e) If project success is defined as meeting the client's requirements and making profit for your organisation; how many successful or unsuccessful projects has your company been involved with over the past 5 years? -----Successful projects -----Unsuccessful projects

(f) What percentage of your clients over the last 5 years will you classify under the following categories?

Developer client	.....
Private client	.....
Public client	.....
Others (please specify)	
----------	.....
	100%

(g) What is the actual number of staff in your organisation? ----------staff

(h) What is your turnover for the last financial year? £----------

(i) Which of the following will you say is your average contract size? (please tick a box)

☐ Under £1 million
☐ £1 million - under £5 millions
☐ £5 millions - under £10 millions
☐ £10 millions - under £15 millions
☐ £15 millions - under £20 millions
☐ Over £20 millions

(j) Which of the following building types account for most of your income?

☐ Single-family houses
☐ Multifamily houses
☐ Nonresidential buildings[a]
☐ Water supply
☐ Industrial plants
☐ Roads and bridges
☐ Civil airports
☐ Power and transmission
☐ Flood control
☐ Mining and metallurgy
☐ Other (please specify)----------

[a] Include schools, hospitals, shops, offices, community facilities, government buildings.

Q2 CLIENT CONSIDERATION

(a) (i) As a construction consulting firm do you carry out any sort of check on your clients before embarking on their project? YES / NO

(ii) If YES do you carry out the check or seek help from other organisation?

Own check Seek help

(iii) Please answer YES or NO if you carry out any check on the following factors in relation to your clients:

Financial stability----------	YES	NO
Feasibility of the proposed project----------	YES	NO
Quality of management----------	YES	NO
Organisational quality----------	YES	NO
Project features----------	YES	NO
Client's attributes (e.g size, sector,etc.)----------	YES	NO
Past experience----------	YES	NO
Past performance----------	YES	NO
Others (please specify)----------	YES	NO

(b) On a scale of 1 to 7, where 1 = Very Little Important (VLI) and 7 = Extremely Important (EI), how will you rate the importance of each of the following factors in ensuring a successful project performance?

	VLI						EI
Financial stability of the client----------	1	2	3	4	5	6	7
Feasibility of client's proposed project----------	1	2	3	4	5	6	7
Quality management in client's organisation--------	1	2	3	4	5	6	7
Organisational quality of the client----------	1	2	3	4	5	6	7
Project characteristics----------	1	2	3	4	5	6	7
Client's attributes (e.g size, sector, etc.) ----------	1	2	3	4	5	6	7
Past experience of client----------	1	2	3	4	5	6	7
Past performance of client----------	1	2	3	4	5	6	7
Prevailing market conditions----------	1	2	3	4	5	6	7
Client's performance of his duties----------	1	2	3	4	5	6	7
Others (please specify).....-----	1	2	3	4	5	6	7

(c) How often does your firm carry out a complete study of client's organisation to establish their original intention of building? ☐ Never ☐ Sometimes ☐ Always

(d) Does your firm have any established procedure for assessing your risk exposure to construction clients? ----------YES NO

If YES kindly give a brief description of your procedure.----------

---

Q3 SUB - FACTORS

Each of the factor listed above in Q2 (b), are probably influenced by the sub - factors listed below under each factor heading. On a scale of 1 to 7, where 1 = bottom mark (bm) and 7 = top mark (tm), how will you rate each of the sub - factors in ensuring a successful project performance?

		bm						tm
(a)	**Financial Stability**							
	(i) Client's current assets	1	2	3	4	5	6	7
	(ii) Credit worthiness of client	1	2	3	4	5	6	7
	(iii) Client's current liabilities	1	2	3	4	5	6	7
	(iv) Others (please specify).....	1	2	3	4	5	6	7
(b)	**Project Feasibility**							
	(i) Client's contribution to project feasibility study	1	2	3	4	5	6	7
	(ii) Client's determination of project priorities	1	2	3	4	5	6	7
	(iii) Appointment of personnel by client	1	2	3	4	5	6	7
	(iv) Site condition	1	2	3	4	5	6	7
	(v) Others (please specify).....	1	2	3	4	5	6	7
(c)	**Quality of Management**							
	(i) Client's experience in project management	1	2	3	4	5	6	7
	(ii) The qualification of client's personnel	1	2	3	4	5	6	7
	(iii) Client's experience with project auditing	1	2	3	4	5	6	7
	(iv) Client's experience with quality assurance procedures	1	2	3	4	5	6	7
	(v) Others (please specify).....	1	2	3	4	5	6	7
(d)	**Organisational Quality of clients**							
	(i) Client's experience in organising the project teams	1	2	3	4	5	6	7
	(ii) Client's experience in organising project interphase	1	2	3	4	5	6	7
	(iii) Allocating project responsibilities	1	2	3	4	5	6	7
	(iv) Others (please specify).....	1	2	3	4	5	6	7
(e)	**Project Characteristics**							
	(i) Type of project	1	2	3	4	5	6	7
	(ii) Size of the project	1	2	3	4	5	6	7
	(iii) Cost of the project	1	2	3	4	5	6	7
	(iv) Complexity of the project	1	2	3	4	5	6	7
	(v) Clarity of project objectives and sub - objectives	1	2	3	4	5	6	7
	(vi) Time available for project completion	1	2	3	4	5	6	7
	(vii) Location of the project	1	2	3	4	5	6	7
	(viii)Others (please specify).....	1	2	3	4	5	6	7

(f) **Client's Attributes**

(i) Type of client---------- 1 2 3 4 5 6 7
(ii) Size of client's organisation---------- 1 2 3 4 5 6 7
(iii) Structure of client's organisation---------- 1 2 3 4 5 6 7
(iv) Communication channels within client's organisation--- 1 2 3 4 5 6 7
(v) Legal history of the client---------- 1 2 3 4 5 6 7
(vi) Others (please specify).....---- 1 2 3 4 5 6 7

(g) **Past Experience**

(i) Number of projects completed by client---------- 1 2 3 4 5 6 7
(ii) Number of years involved in construction activities----- 1 2 3 4 5 6 7
(iii) Types of projects completed---------- 1 2 3 4 5 6 7
(iv) Experience of client personnel---------- 1 2 3 4 5 6 7
(v) Others (please specify).....--- 1 2 3 4 5 6 7

(h) **Past Performance**

(i) Number of successful projects completed by client------ 1 2 3 4 5 6 7
(ii) Number of unsuccessful projects---------- 1 2 3 4 5 6 7
(iii) Cost overrun due to client---------- 1 2 3 4 5 6 7
(iv) Time overrun due to client---------- 1 2 3 4 5 6 7
(v) Quality achieved---------- 1 2 3 4 5 6 7
(vi) Others (please specify)---------- 1 2 3 4 5 6 7

Q4 CLIENT RESPONSIBILITIES

For any construction project, the client has some roles to play in order to ensure a successful project performance. Below are some statements about these roles. On a scale of 1 to 7, where 1 = bottom mark (bm) and 7 = top mark (tm), what level of importance will you attach to each role in relation to successful project performance?

	bm						tm
(a) The client must play an active role in his project definition/formulation--	1	2	3	4	5	6	7
(b) The client need sufficient finance to get the project through----------	1	2	3	4	5	6	7
(c) The client should know all the available contracting routes----------	1	2	3	4	5	6	7
(d) The client should leave all the legal agreements to their consultants------	1	2	3	4	5	6	7
(e) The client must take human factors such as skill, etc. seriously----------	1	2	3	4	5	6	7
(f) The client should ensure that his project is adequately implemented and managed----------	1	2	3	4	5	6	7
(g) The client should place a lot of emphasis on political / social issues----	1	2	3	4	5	6	7

(h) The client should instil a degree of urgency in his personnel including the consultants---------- 1 2 3 4 5 6 7

(i) The client must ensure that the project adhere to its schedule duration--- 1 2 3 4 5 6 7

(j) The client must ensure that his project is adequately planned/designed-- 1 2 3 4 5 6 7

(k) Construction clients are more likely to improve their performance on projects during recession---------- 1 2 3 4 5 6 7

(l) Construction client are more likely to improve their performance on projects during economic boom---------- 1 2 3 4 5 6 7

Q5 Please list in order of importance the factors you use to assess a project as a success or a failure:

Success Factors	Failure Factors
1st----------	1st----------
2nd----------	2nd----------
3rd----------	3rd----------
4th----------	4th----------
5th----------	5th----------
6th----------	6th----------
7th----------	7th----------

Q6 Do you quantify the risk that clients may pose to your project(s) being successfully executed? (please encircle the right answer) YES / NO

If YES please describe how you quantify the risk:----------

Q7 How will you apportion blame on projects not successfully completed (please give your answer in percentage terms e.g if you were responsible for half of the blame, give yourself 50%).

Yourself (Consultants)	-------
Client	-------
Contractor	-------
	100%

Q8 If it were possible to insure your projects against failure in relation to your commercial viability how much premium will you be ready to pay for the following project sizes:

Project Size	Premium
< £50000	----------
50000-500000	----------
500000-£ 1m	----------
£ 1m - £10m	----------
> £10m	----------

Q9 As a business institution, you have certain requirements which you want to satisfy when embarking on a project; below are some of these requirements. On a scale of 1 to 7, where '1' = very little importance (VLI) and '7' = extremely important (EI), how will you rate each of the requirement in ensuring your commercial viability? (please encircle a number in each case).

	VLI						**EI**
Profit making----------	1	2	3	4	5	6	7
Increase Turnover----------	1	2	3	4	5	6	7
Maintain positive cashflow----------	1	2	3	4	5	6	7
To adequately understand clients' requirements----------	1	2	3	4	5	6	7
Maintain full order book (work to full capacity)----------	1	2	3	4	5	6	7
To have a good image / prestige ----------	1	2	3	4	5	6	7
To satisfy clients ----------	1	2	3	4	5	6	7
Produce high quality design----------	1	2	3	4	5	6	7
Others (please specify)							
.....----------	1	2	3	4	5	6	7
.....----------	1	2	3	4	5	6	7
.....----------	1	2	3	4	5	6	7
.....----------	1	2	3	4	5	6	7

Please tick the box below if you would like a summary of the findings from this survey.

☐

Thank you for your cooperation

S. T. KOMETA

APPENDIX C

APPENDIX C

GUIDELINES FOR MERIT VALUES ELICITATION

S1.1 project priorities

S1.1a Are the project priorities crystal clear to you? **YES** score a maximum of 50 points depending on the degree of clarity; **NO** score zero.

S1.1b Does some of the project priorities coincide with your practice priorities? **YES** score a maximum of 50 points depending on the extent of the coincidence; **NO** score zero.

Merit value = S1.1a score ..... + S1.1b score ..... = total ...../ 100 = ...

S1.2 feasibility study

S1.2a Does the client insist on carrying out a comprehensive feasibility study which include desk, financial and field studies? **YES** score a maximum of 33 points depending on the extent of the study; **NO** score zero.

S1.2b Does the client provide sufficient information for the study to your satisfaction? **YES** score a maximum of 33 points depending on the extent of information provided; **NO** score zero.

S1.2c Does the client provide sufficient funding for the feasibility study? **YES** score a maximum of 34 points depending on the extent of the funding; **NO** score zero.

Merit value = S1.2a score .....+ S1.2b score..... + S1.2c score..... =total ...../ 100 =.....

S1.3 site condition

S1.3a Does the physical characteristics of the site need any treatment (such as compaction)? **YES** score zero; **NO** score 100. IF YES go to S1.3b OTHERWISE go to S1.4.

S1.3b Is the client willing to pay for the treatment? **YES** score 100; **NO** score zero.

Merit value = S1.3a score ..... or S1.3b score = score ...../ 100 = ...

S1.4 personnel appointment

S1.4a Is the appointed client personnel in charge of the feasibility study cooperating with the consultants? **YES** score a maximum of 50 points; **NO** score zero.

S1.4b Does he/she has the full authority to take decision on behalf of the client organisation ? **YES** score a maximum of 50 points; **NO** score zero.

Merit values = S1.4a score ..... + S1.4b score ..... = total score ...../ 100 =.....

S2.1 project finance

S2.1a Does the client have evidence of financial support for the project? **YES** score a maximum of 50 points; **NO** score zero.

S2.1b Do the project sponsors support the project? **YES** score a maximum of 50 points; **NO** score zero.

Merit values = S2.1a score ..... + S2.1b score ..... = total score ...../ 100 =.....

S2.2 project definition / formulation

S2.2a Has the client allocated enough time for the project definition / formulation? **YES** score a maximum of 50 points; **NO** score zero.

S2.2b Does the client provide enough information for the development of the design brief? **YES** score a maximum of 50 points; **NO** score zero.

Merit values = S2.2a score ..... + S2.2b score ..... = total score ...../ 100 =.....

S2.3 planning / design

S2.3a Has client organisation undertaken any in-house design of the project? **YES** score a maximum of 33 points; **NO** score zero.

S2.3b Does client have any plan on how to achieve the project requirements? **YES** score a maximum of 33 points; **NO** score zero.

S2.3c Does the client insist on introducing constructability programmes during the detail design and engineering of the project? **YES** score a maximum of 34 points; **NO** score zero.

Merit value = S2.3a score .....+ S2.3b score..... + S2.3c score..... =total ...../ 100 =.....

S2.4 project implementation / management

S2.4a Is the procurement route selected suitable for the project? **YES** score a maximum of 25 points; **NO** score zero.

S2.4b Is the type of contract selected suitable for the project? **YES** score 25; **NO** score zero.

S2.4c Is the form of contract selected suitable for the project? **YES** score 25; **NO** score zero.

S2.4d Does the client insist on regular update of progress reports? **YES** score 25; **NO** score zero.

Merit value = S2.4a score .....+ S2.4b score..... + S2.4c score..... + S2.4d.....

= total ...../ 100 =.....

S2.5 human factors

S2.5a Rate the client's senior management support for the project on the following scale.

Very poor support for project — Moderate support for project — Excellent support for project

10.....20.....30.....40.....50.....60.....70.....80.....90.....100

S2.5b Rate the adequacy and experience of client team on the following scale.

Inadequate and inexperience team — Moderately adequate and experience team — Highly adequate and very experience team

10.....20.....30.....40.....50.....60.....70.....80.....90.....100

S2.5c Rate the competency of client personnel on the following scale.

Not competent — Moderately competent — Highly competent

10.....20.....30.....40.....50.....60.....70.....80.....90.....100

Merit value = S2.5a score.....+ S2.5b score.....+ S2.5c score....= total score ...../ 300 = ...

S2.6 schedule duration

S2.6a Does the client have/support the schedule for the project duration? **YES** score a maximum of 100; **NO** score zero.

Merit value = S2.6a score ...../ 100 = ...

S2.7 schedule urgency

S2.7a Does the client instilled the required degree of urgency in the project personnel i.e avoid rushing by all means and discouraging delays? i.e taking quick and effective decision as they unfolds. **YES** score a maximum of 100 points; **NO** score zero.

Merit value = S2.7a score ...../ 100 = ...

S2.8 legal agreements

S2.8a Does the client respect contract conditions? **YES** score a maximum of 100 points; **NO** score zero.

Merit value = S2.8a score ...../ 100 = ...

S2.9 contracting

S2.9a Are contract documents tailored to fit the special circumstances of the individual project? **YES** score a maximum of 20 points; **NO** score zero.

S2.9b Does the contract clearly express the full agreement between the parties concerning technical and procedural matters? **YES** score a maximum of 20 points; **NO** score zero.

S2.9c Is the allocation of performance risks between the parties compatible with each party's ability to manage risks? **YES** score a maximum of 20 points; **NO** score zero.

S2.9d Does the contract indicate that the client will be involved in the project safety management programmes? **YES** score a maximum of 20 points; **NO** score zero.

S2.9e Are there any incentives in the contract to improve performance? **YES** score a maximum of 20 points; **NO** score zero.

Merit value = S2.9a score.....+ S2.9b score.....+ S2.9c score.....+ S2.9d score....+ S2.9e score..... = total score ...../ 100 = ...

S2.10 politics / social factors

S2.10a Does the client have any contingency plan in case of political instability during the course of the project? **YES** score 50; **NO** score zero.

S2.10b Does the client have any contingency plan in case of social strike during the course of the project? **YES** score 50; **NO** score zero.

Merit values = S2.10a score ..... + S2.10b score ..... = total score ...../ 100 =.....

S3.1 credit-worthiness

S3.1a Calculated using the following formula:

$$\text{Gearing \%} = \frac{\text{*Loan capital + *Bank borrowing and Others}}{\text{*Capital employed}}$$

Merit value = 1 - gearing (in decimals) = ...

* figures extracted from last year's trading accounts

S3.2/S3.3 current assets / current liabilities

S3.2a/S3.3a Is current ratio above critical limit of 1.0? **YES** 100; **NO** score zero.

Merit value = score ...../ 100 = ...

Alternatively, if client agrees to set up a trust fund, allocate 100 point to each sub-attribute.

S4.1 cost performance (reference from other consultants)

S4.1a Did the contract overrun on cost ? **YES** score zero; **NO** score 50.

S4.1b What approximate percentage of the overrun is attributable to the client making change orders and not allowing for cost? (a) .....%

Now deduct (a) expressed in decimal from 1.0 and multiply by 50 =.....

Merit value = S4.1a score ..... +S4.1b score ..... = total score ..... /100 =.....

S4.2 time performance

S4.2a Did the contract overrun on time? **YES** score zero; **NO** score 50.

S4.2b What approximate percentage of the overrun is attributable to the client making change orders and not allowing for time? (a).....%

Now deduct (a) expressed in decimal from 1.0 and multiply by 50 =.....

Merit value = S4.2a score ..... +S4.2b score ..... = total score ..... /100 =.....

S4.3 quality performance

S4.3a How did the client influenced the achievement of quality in the finished product? answer on the following scale:

Not influential Averagely influential Very influential

10.....20.....30.....40.....50.....60.....70.....80.....90.....100

Merit value = S4.3a score ..... / 100 =.....

S4.4/S4.5 Unsuccessful / successful projects

S4.4a/S4.5a Has client been involved in more than two successful projects within the last five years? **YES** score 100 points for successful project; **NO** score zero for unsuccessful projects.

Merit value = S4.4a score ..... or S4.5a score ..... = score ...../ 100 = ...

S5.1 time for completion

S5.1a Has the client allow enough time for the completion of the project bearing in mind the availability of labour, plant, and material? **YES** score 50; **NO** score zero.

S5.1b Is the time allow realistic judging from your experience? **YES** score 50; **NO** score zero.

Merit value = S5.1a score ..... + S5.1b score ..... = score ...../ 100 = ...

S5.2 objectives / sub-objectives

S5.2a Has the client undertaken any predesign / preconstruction meeting(s) to ensure the the project objectives / sub-objectives are understood? **YES** score 34; **NO** score zero.

S5.2b Has client circulate letters to all participants detailing the objectives / sub-objectives of the project? **YES** score 33; **NO** score zero.

S5.2c Has there been an executive review in client organisation to ensure that the project objectives / sub-objectives are clear? **YES** score 33; **NO** score zero.

Merit value = S5.2a score.....+ S5.2b score.....+ S5.2c score....= total score ...../ 100 = ...

S5.3 complexity

S5.3a Is client project difficult to design (e.g high-tech office block)?

YES score zero; **NO** score 50.

S5.3b Is client project complex to construct (i.e require special construction techniques)?

YES score zero; **NO** score 50.

Merit value = S5.3a score.....+ S5.3b score.....= total score ...../ 100 = ...

S5.4 type of project

S5.4a Has the client been involved with this type of project before?

YES score 100; **NO** score zero.

Merit value = S5.4a score ...../ 100 =.....

S5.5 cost of project

S5.5a Is the client in-house estimate of the contract sum realistic for the project?

YES score 50; **NO** score zero.

S5.5b Is the consultant satisfy with the percentage of his fee in relation to the contract sum?

YES score 50; **NO** score zero.

Merit value = S5.5a score.....+ S5.5b score.....= total score ...../ 100 = ...

S5.6 size of project

S5.6a Is the proposed project of size often undertaken by consultant?

YES score 50; **NO** score zero.

S5.6b Is the proposed project of size often undertaken by client organisation?

YES score 50; **NO** score zero.

Merit value = S5.6a score.....+ S5.6b score.....= total score ...../ 100 = ...

S5.7 location

S5.7a Has the project consultant worked in the vicinity of the project location before?

YES score 100; **NO** score zero.

Merit value = S5.7a score ...../ 100 = ...

S6.1 allocation of project responsibilities

S6.1a Is the consultant's responsibility to the project clearly understood?

YES score 50; **NO** score zero.

S6.1b Are the responsibilities of the other participants to the project clear to them?

YES score 50; **NO** score zero.

Merit value = S6.1a score.....+ S6.1b score.....= total score ...../ 100 = ...

S6.2 organisation of project team

S6.2a Does the client has a special group or committee responsible for the project organisation? **YES** score 100; **NO** score zero.

Merit value = S6.2a score ...../ 100 = ...

S6.3 coordination of project interphase

S6.3a Has the client decide on how to coordinate the project as a whole?

YES score 100; **NO** score zero.

Merit value = S6.3a score ...../ 100 = ...

S7.1 experience of personnel

S7.1a Are client personnel experienced in construction matters (answers from referee)?

YES score 50; **NO** score zero.

S7.1b Does client personnel have experience of the particular project at hand?

YES score 50; **NO** score zero.

Merit value = S7.1a score.....+ S7.1b score.....= total score ...../ 100 = ...

S7.2 number of projects completed

S7.2a Has client organisation completed more than two project within the last five years?

YES score 100; **NO** score zero.

Merit value = S7.2a score ...../ 100 = ...

S7.3 involvement in construction activities

S7.3a Is client organisation a member to any client body such as BPF, CIEC etc.?

YES score 100; **NO** score zero.

Merit value = S7.3a score ...../ 100 = ...

S8.1 project management experience

S8.1a Has client organisation been involved in project management within the last five years?

YES score 50; **NO** score zero.

S8.1b Has client managed similar type of construction before?

YES score 50; **NO** score zero.

Merit value = S8.1a score.....+ S8.1b score.....= total score ...../ 100 = ...

S8.2 qualifications of personnel

S8.2a Do client key personnel hold a construction related degree?

YES score 33; **NO** score zero.

S8.2b Are client key personnel between the age of 30 - 40 years old?

YES score 33; **NO** score zero.

S8.2c Are client key personnel corporate members of the CIOB or the ICE or other professional body? **YES** score 34; **NO** score zero.

Merit value = S8.2a score.....+ S8.2b score.....+ S8.2c score.....

= total score ...../ 100 = ...

S8.3 project auditing

S8.3a Does client organisation has an internal review or audit facilities to monitor the project operations? **YES** score 50; **NO** score zero.

S8.3b Do they identify shortfalls and assure integrity? **YES** score 50; **NO** score zero.

Merit value = S8.1a score.....+ S8.1b score.....= total score ...../ 100 = ...

S8.4 quality assurance

S8.4a Does the client prequalify candidate for the project based on their quality control policy (i.e BS 5750 or ISO 9000 accreditation)? **YES** score 50; **NO** score zero.

S8.4b Has the client determine the extent of quality application on the project?

YES score 50; **NO** score zero.

Merit value = S8.4a score.....+ S8.4b score.....= total score ...../ 100 = ...

S9.1/S9.2 economic boom / economic recession

S9.1a/S9.2a From consultant's experience, do clients take advantage of the economic cycle in construction? **YES** score zero; **NO** score 100.

Merit value = S9.1a/S9.2a score ...../ 100 = ...

S10.1 type of client

S10.1a Has the consultant has a previous working relationship with this type of client?

IF NO: score zero

IF YES: How does the consultant rate that previous relationship on the following scale:

This end of scale represent a poor previous relationship — This end of scale represent a good previous relationship

10.....20.....30.....40.....50.....60.....70.....80.....90.....100

Merit value = S10.1a score ...../ 100 = ...

S10.2 structure of client organisation

S10.2a How long (in days) does the client take to provide a simple information requested by the consultant?

Takes many days to provide information — Takes a few days to provide information

Days ≥10..... 9..... 8..... 7..... 6..... 5..... 4..... 3..... 2..... ≤1

Scale 10.....20.....30.....40.....50.....60.....70.....80.....90.....100

Days corresponding to scale gives point on scale.

Merit value = S10.2a score ...../ 100 = ...

S10.3 legal history

S10.3a Has client been involved in any litigation within the last two years at his fault?

YES score zero; **NO** score 100.

Merit value = S10.3a score ...../ 100 = ...

The above completes the evaluation procedure.

APPENDIX D

APPENDIX D

CONSULTANTS' QUESTIONNAIRE / INTERVIEW FORMAT FOR THE VALIDATION EXERCISE

Section 1

Please select a project you have recently completed and give the following information.

1 Background Information

1.1 Project Characteristics

(a) Projected total cost ----------

(b) Actual total cost ----------

(c) What % of the difference between (a) and (b) will you attribute to the client? ----------

(d) Projected contract time ----------

(e) Actual contract time ----------

(f) What % of the difference between (d) and (e) will you attribute to the client? ----------

(g) Projected profit (fee) ----------

(h) Actual profit (fee) ----------

(i) What % of the difference between (g) and (h) will you attribute to the client? ----------

(j) What level of importance ranging from 1(min.) to 5 (max.) will you attach to the following aspects of quality on this project.
Functional....., Technical....., Aesthetic....., Comfort ....., Prestige...

(k) How would you rate the client's influence on your achievement of these aspects of quality, 7 = Very influential, 1 = Not influential at all
Functional....., Technical....., Aesthetic....., Comfort ....., Prestige...

(l) Type of project ----------

(m) How would you distribute 100 points on the level of importance that your organisation attaches to meeting cost, time, quality and profit targets on the project.
Cost = ..., Time = ..., Quality = ..., Profit = ...

1.2 Client Characteristics

(a)	Type of owner (e.g. private, public)	----------
(b)	In-house procurement	Yes / No
(c)	In-house design	Yes / No
(d)	In-house project controls	Yes / No

1.3 Consultant Characteristics

(a)	Type of consultant (e.g. private, public, multidisciplinary integrated practice)	----------
(b)	Procurement division	Yes / No
(c)	Construction division	Yes / No

Section 2

3 Client Attributes

You may refer to the guidelines provided in completing this part of the questionnaire.

Sub-attributes to be evaluated (Each sub-attribute is evaluated under its respective main attributes)	With respect to the chosen project give a numerical judgment on a scale 0 to 100 of the client's performance/consideration/awareness of the following sub-attributes (0 - Very poor 100 - Excellent)	Qualifying comments
PROJECT FEASIBILITY:		
Project priorities		
Feasibility study		
Site condition		
Personnel appointment		
CLIENT'S DUTIES:		
Project finance		
Project definition / formulation		
Planning and design		
Project implementation / management		
Human factors		
Schedule duration		
Schedule urgency		
Legal agreements		
Contracting		
Politics / social factors		
FINANCIAL STABILITY:		
Credit-worthiness		
Current ratio: Current assets/ Current liabilities		

Sub-attributes to be evaluated (Each sub-attribute is evaluated under its respective main attributes)	With respect to the chosen project give a numerical judgment on a scale 0 to 100 of the client's performance / consideration / awareness of the following sub-attributes (0 - Very poor 100 - Excellent)	Qualifying comments
PAST PERFORMANCE:		
Cost overrun		
Time overrun		
Quality achieve		
Unsuccessful projects		
or Successful projects		
PROJECT CHARACTERISTICS:		
Time for completion		
Objectives / sub-objectives		
Complexity		
Type of project: i.e had client been involved in this type of project before?		
Cost of project: i.e does the money client plan to spend on the project realistic?		
Size of project: i.e had client experience execution of contract of similar size?		
Location: i.e was client organisation situated near the project location?		
ORGANISATIONAL QUALITY:		
Allocation of project responsibilities		
Organisation of project team		
Coordination of project interphase		
PAST EXPERIENCE:		
Experience of personnel		
Number of project completed: i.e had client completed more than 2 projects in last 5yrs?		
Construction activities: i.e does client have a working knowledge of the constr. ind?		
Types of projects: i.e had client been involved in a variety of projects in the past?		

Sub-attributes to be evaluated (Each sub-attribute is evaluated under its respective main attributes)	With respect to the chosen project give a numerical judgment on a scale 0 to 100 of the client's performance / consideration / awareness of the following sub-attributes (0 - Very poor 100 - Excellent)	Qualifying comments
QUALITY OF MANAGEMENT:		
Project management		
Qualifications of personnel		
Project auditing		
Quality assurance		
STATE OF THE ECONOMY:		
Economic boom / recession: i.e does client take advantage of the economic cycle, for instance investing in building during economic recession to obtain low cost?		
CLIENT CHARACTERISTICS:		
Communication		
Type of client		
Structure		
Size of client		
Legal history		

Thank you for your cooperation

S. T. KOMETA

APPENDIX E

APPENDIX E

DESCRIPTION OF PROJECTS USED FOR VALIDATION

Project A

Project A was a Sheltered Flats construction for a private client, who had an in-house procurement, design and project controls capability. The project overran on both time and budget at a cost of £800,000. Data for this project was collected mainly via a mailed questionnaire which was divided into two parts (See Appendix D). Part 1 sought information on actual project outcome in terms of time, cost, quality and fees and part 2 information on the model.

Project B

Project B was the construction of a stadium for a private football club. It was completed over planned construction time and budget at a cost of £11,500,000. The client had no in-house procurement, design or project controls capability, the project was handled entirely by the consultant. Data for this project was collected by way of structured interview with the senior partner / executive of the consulting firm.

Project C

Project C was an infrastructure project for a private developer. It was a grocer's chain headquarters and distribution centre. The project was completed on time and over budget at a cost of £13,000,000. The developer had in-house project controls capability but no in-house procurement or design capability. Data for this project was collected via a mailed questionnaire.

Project D

Project D was completed on time but over budget at a cost of £255,000. The owner was a private client with in-house procurement and project controls capability but no in-house design capability. Data for this project was collected mainly via a mailed questionnaire.

Project E

Project E was a home improvement / urban renewal project for a public sector client. Data for this

project was collected by way of structured interview with the managing director of the construction firm. The project was substantially completed at the time of the interview, had already taken twice as long to complete and was over budget at a cost of £9,517.18. The client had in-house procurement, design and project controls capability.

Project F

Project F was a leisure centre commissioned by a public sector client. Data was collected through a mailed questionnaire. The project cost £3m and took 20 months to complete. The client had in-house procurement, design and project controls capability. The consultant for the project was also from a public sector and had procurement and construction divisions within their practice.

Project G

Data for this project was collected by way of a mailed questionnaire. The type of project was not specify but it was commissioned by a public sector client who had in-house procurement and project controls but not in-house design ability. The project was designed by a private consultant with a procurement division but no construction division. The project cost £3.8m and took 12 months to complete.

Project H

Project H was a food processing plant for a private sector plant who had no sort of project in-house capability. The consulting firm was a multi disciplinary integrated practice with no procurement or construction division. The project cost £213,000 and took 4 months to complete. Information on the project was collected by a mailed questionnaire.

Project I

Project I was community rooms commissioned by a church trustees/private client with no sort of in-house project capability. The project was designed by a private architect firm with a procurement division but no construction division. It cost £230,000 and took 11 months to complete. Data was collected by a mailed questionnaire.

Project J

Project J was a dwelling development for a private sector client with in-house procurement, design and project controls capability. The consultant was a private practice with procurement division. The project cost £121,000 and took 6 months to complete.

Project K

Project K was a sport centre extension for a public / local authority client with substantial in-house project capability. It was designed by a private sector firm with both procurement and construction divisions. The project cost a quarter of a million and took 7 months to complete. Information for the project was collected by a mailed questionnaire.

Project L

Project L was an hotel construction in city centre by a private sector client with in-house project controls capability but not procurement or design capability. The consultant was a private practice with no procurement or construction division. The project cost £14m and took 32 months to complete. Data for the project was collected through a questionnaire.

Project M

Project M was building alterations for an educational trust client with in-house procurement and project controls capability. The project was designed by a private sector consulting firm with neither a procurement nor a construction divisions within their practice. The project cost £450,000 and took 15 weeks to complete.

Project N

The type of project was not specified but was commissioned by a public sector client with only in-house procurement capability. The consulting firm was a private practice with construction division but not procurement division. The project cost £1,640,000 and took 7.5 months to complete. Data was collected by a mailed questionnaire.

Project O

Project O was an infrastructure project commissioned by a developer with only in-house project

controls capability. The project was designed by a private practice with neither a procurement nor a construction division. The project cost £705,635 and took 8 months to complete. Data was collected by a mailed questionnaire.

Project P

Project P was an housing association new build scheme for an housing association client with in-house procurement, design and project controls capability. The consultant was a multi disciplinary integrated practice with only a procurement division. The project cost £1.3m and took 59 weeks to complete. Information for the project was collected by a mailed questionnaire.

Project Q

Project Q was an office block development commissioned by a developer client with in-house procurement, design and project controls capability. The project was designed by a multi disciplinary integrated practice with neither a procurement nor a construction division. The estimated cost of the project was £3.5m and the final cost was not specified. The project took 13.5 months to complete.

Project R

Project R was a swimming pool construction commissioned by a public sector client with in-house procurement, design and project controls capability. The project was design by a public sector consulting practice with both procurement and construction divisions. The project cost £4.28m and took 18.5 months to complete. Data for the project was collected by a questionnaire design.

Project S

Project S was a retail shop commissioned by private client with no in-house project capability. The project was designed by a private practice with neither a procurement nor a construction division. The project cost £1.6m and took 5 months to complete. Information for this project was collected by a mailed questionnaire.

Project T

Project T was an industrial development commissioned by a private client with only in-house

procurement capability. The consulting firm was a multi disciplinary integrated practice which occasionally set up a procurement and a construction division. The project cost £1,545,000 and took 7 months to complete. Data for the project was collected by a mailed questionnaire.

Project U

The type of project was not specified but was commissioned by a public sector client with in-house project capability. The project was designed by a private practice with neither a procurement nor a construction division. The project cost £212,000 and took 8.5 months to complete. Data for the project was collected by a mailed questionnaire.

Project V

Project V was a superstore commissioned by a private sector client with only in-house project controls. The project was designed by a private sector consulting practice with neither a procurement nor a construction division. The project cost £1.7m and took 9 months to complete. Project information was collected by a questionnaire.

Project W

Project W was a theatre/art centre commissioned by a public sector client with only in-house procurement capability . The designer was a private civil / structural engineering practice with neither a procurement nor a construction division. The project cost £3.1m and took 17 months to complete. Information for this project was collected by a mailed questionnaire.

Project X

Project X was an office B1 project commissioned by a private sector client with only in-house project controls capability. The project was designed by a private consulting practice with both procurement and construction divisions. The project cost £6.9m and took 18 months to complete. Information for this project was collected by a mailed questionnaire.

Project Y

Project Y was a jetty construction commissioned by a public sector client with in-house procurement, design and project controls capability. The project was designed by a private sector

consulting practice with neither procurement nor construction divisions. The project cost £456,200 and took 6 months to complete. Data for the project was collected by a mailed questionnaire.

Project Z

The type of project was not specified and was commissioned by a public sector client with in-house procurement and project controls capability. The project was designed by a private sector consulting practice with no procurement or construction division. The project cost £5.3m and took 24 months to complete. Information for this project was collected by a mailed questionnaire.

Project AA

Project AA was a process plant building for a private sector client with only in-house project controls capability. Designed by a private practice with a procurement division. The project cost £7.5m and took 9 months to complete. Data for the project was collected by a mailed questionnaire.

Project AB

Project AB was a highway construction project commissioned by a public sector client with in-house procurement and project controls capability but no in-house design facility. The project was designed by a private sector consulting practice with neither a procurement nor a construction division. Information for this project was collected by a mailed questionnaire.

Project AC

This was an educational / school project for a public / local authority client with in-house procurement, design and project controls capability. Was designed by a multi disciplinary integrated practice with a construction division. The project cost £795,000 and was completed in 12 months. Information for this project was collected by a mailed questionnaire.